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DRAFT Environmental Impact Statement

High Uintas Wilderness – Colorado River Cutthroat Trout Habitat Enhancement

Roosevelt/Duchesne Ranger District, Ashley National Forest
Duchesne County, Utah

High Uintas Wilderness – Colorado River Cutthroat Trout Habitat Enhancement Draft Environmental Impact Statement Duchesne County, Utah

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Cooperating Agencies:	**Utah Division of Wildlife Resources**
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Abstract: The Ashley National Forest, in cooperation with the Utah Division of Wildlife Resources (collectively referred to hereafter as the Agencies), proposes to enhance habitat for native Colorado River cutthroat trout *(Oncorhynchus clarki pleuriticus)* in selected headwater basins in the High Uintas Wilderness on the Roosevelt/Duchesne Ranger District of the Ashley National Forest (Proposed Action). The objective of the Proposed Action is to re-establish populations of Colorado River cutthroat trout (CRCT) in selected headwater basins free from competing and hybridizing nonnative trout species. This is an important step toward meeting the Conservation Strategy goal to assure the long-term viability of CRCT throughout their historic range and is an effort toward meeting the objective to secure and enhance conservation populations by removing nonnative fish species.

This Draft Environmental Impact Statement (DEIS) considers two alternatives; the No Action alternative and the Proposed Action alternative. The Proposed Action and preferred alternative would use the piscicide rotenone to remove competing and hybridizing nonnative fish from selected headwater streams and lakes. The primary fish species to be removed are brook trout *(Salvelinus fontinalis)* and hybridized and nonnative cutthroat trout *(Onchorhynchus clarki spp.)*. However, all fish species would be removed as a result of the treatment. Rotenone would be neutralized using potassium permanganate at or below a migration barrier downstream of the areas targeted for treatment. Approximately one year following the last treatment of the selected basin, CRCT would be restocked. Chapter 2 presents a detailed description of the Proposed Action and alternatives.

Reviewers should provide the Forest Service with their comments during the review period of the DEIS. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the Final Environmental Impact Statement (FEIS), thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' positions and contentions. Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the FEIS. Comments on the DEIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

How to comment and timeframe:

Written, facsimile, hand-delivered, and electronic comments concerning this proposal will be accepted for 45 days following the date the Environmental Protection Agency publishes the notice of availability (NOA) of this DEIS in the Federal Register. The publication date of the NOA in the Federal Register is the exclusive means for calculating the comment period for a proposed action documented in a DEIS. Those wishing to comment should not rely upon dates or timeframe information provided by any other source.

On March 27, 2013, a final rule revising 36 CFR Part 218 (pre-decisional objection procedures) was published in the Federal Register and became effective upon that publication date. Only those who submit timely and specific written comments regarding the proposed project during a public comment period established by the responsible official are eligible to file an objection.

Submit written comments to the responsible official c/o the Ashley National Forest at the following address:

Kristy Groves
Duchesne Ranger District
P. O. Box 981
85 West Main
Duchesne, Utah 84021

The office business hours for those submitting hand-delivered comments are 8:00 A.M. to 4:30 P.M. Monday through Friday, excluding holidays. Electronic comments should contain **High Uintas Wilderness – CRCT** in the subject line and may be submitted in common formats such as an email message, portable document format (.pdf), plain text (.txt), rich text format (.rtf), Word (.doc or .docx), or hypertext markup language (.html) to: **comments-intermtn-ashley@fs.fed.us**. Comments must have an identifiable name attached or verification of identity will be required. A scanned signature may serve as verification on electronic comments.

SUMMARY

The Ashley National Forest, in cooperation with the Utah Division of Wildlife Resources, proposes to treat selected waters within the High Uintas Wilderness with rotenone to remove nonnative fish species and enhance habitat for native Colorado River cutthroat trout (CRCT). The area affected by the proposal includes selected lakes and streams in headwater basins within the Rock Creek, Lake Fork and Yellowstone River drainages. These areas are generally characterized as high elevation, alpine meadows. A larger portion of areas proposed for treatment occur near or above timberline. This action would help ensure the continued viability of CRCT populations within the High Uintas Wilderness by removing competing and hybridizing nonnative fish species.

A Conservation Strategy for Colorado River cutthroat trout has been developed by cooperating State and Federal agencies in Colorado, Wyoming and Utah. The Forest Service and the Utah Division of Wildlife Resources are parties to this Conservation Strategy and Agreement. The removal of nonnative fish to restore and enhance habitat for CRCT populations is identified as a major activity to meet Strategy objectives.

Headwater basins within the High Uintas Wilderness have long been identified as target areas for enhancing habitat for CRCT by removing competing and hybridizing nonnative trout species. Brook trout populations within the Rock Creek, Lake Fork River and Yellowstone River drainages continue to expand into cutthroat trout habitat and are replacing cutthroat trout populations through competition within these headwater drainage basins.

This Draft Environmental Impact Statement considers two alternatives including the No Action and Proposed Action alternatives.

Major conclusions include:

- The use of rotenone to remove fish would result in short-term impacts to aquatic macroinvertebrate populations.
- The use of rotenone to remove fish may result in long-term impacts to more sensitive macroinvertebrate populations within treatment areas but is not expected to contribute to a negative trend in macroinvertebrate populations on the Ashley National Forest.
- The use of rotenone to remove fish may impact individual amphibians but is not expected to contribute to a negative trend in amphibian populations of the Ashley National Forest.
- There would be localized impacts to fishing opportunities for approximately four years between the time period of the initial rotenone treatment and approximately two years following the last treatment of the selected waters.

Based upon the analysis of the alternatives, the responsible official will decide whether to allow the use of rotenone to remove nonnative fish species within selected waters in the High Uintas Wilderness of the Ashley National Forest. The responsible official will also make the decision whether to allow the use of mechanized and/or motorized equipment in the wilderness to disperse and neutralize rotenone.

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CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

Document Structure

The Forest Service has prepared this Draft Environmental Impact Statement (DEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This DEIS discloses the direct, indirect, and cumulative environmental impacts that would result from the Proposed Action and alternatives. The document is organized into four chapters:

- *Chapter 1. Purpose and Need for Action:* This chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2. Alternatives, including the Proposed Action:* This chapter provides a more detailed description of the agency's Proposed Action as well as any alternative methods for achieving the stated purpose. Alternatives are developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3. Affected Environment and Environmental Consequences*: This chapter describes the environmental effects of implementing the Proposed Action as well as any other alternatives. This analysis is organized by resource area.
- *Chapter 4. Consultation and Coordination:* This chapter provides a list of preparers and agencies consulted during the development of the EIS.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Roosevelt/Duchesne District Office at 85 West Main, Duchesne, Utah 84021.

Background

Colorado River cutthroat trout (CRCT) currently occupy an estimated 14% of historically occupied habitat (Hirsch et al. 2006). Threats and factors contributing to the decline of CRCT populations from historic levels include the introduction and subsequent proliferation of nonnative trout species and habitat fragmentation. It is generally believed that the introduction of nonnative salmonids may have had the greatest effect on CRCT (Hirsch et al. 2006). CRCT are currently cooperatively managed as a conservation species in Colorado, Wyoming and Utah, by the U.S. Forest Service (USFS), U.S. Bureau of Land Management (BLM), U. S. Fish and Wildlife Service (USFWS) and the Ute Tribe Fish and Game Department. The CRCT is designated as a species of special concern by Colorado and Wyoming, and a Tier I species in Utah. A Tier I species is defined as a species that is either federally listed or for which a conservation agreement has been implemented. The CRCT is classified as a sensitive species by Regions 2 and 4 of the USFS and by the BLM in Colorado, Wyoming and Utah.

Expanding populations of nonnative brook trout *(Salvelinus fontinalis)*, Yellowstone cutthroat trout *(Oncorhynchus clarki bouvieri)* and cutthroat trout hybrids continue to threaten populations of native CRCT throughout their historic range including populations within the High Uintas Wilderness on the Ashley National Forest. Brook trout continue to displace CRCT through competition within suitable habitat while Yellowstone cutthroat trout and their hybrids threaten genetically pure populations of CRCT with hybridization.

This action would reduce competition with and preserve the genetic integrity of native CRCT populations by removing nonnative cutthroat trout and brook trout. This would be accomplished by treating lakes and streams within selected drainage basins with the piscicide rotenone to remove the current fish population and the threat of hybridization and competition with nonnative trout. Following treatment of selected waters, CRCT would be reintroduced through stocking of fingerlings obtained from the well developed brood population held in Sheep Creek Lake on the Ashley National Forest.

Purpose and Need for Action

The purpose of this project is to establish CRCT populations free of competing and hybridizing fish species in lakes and streams of selected headwater basins of the High Uintas Wilderness on the Ashley National Forest. Therefore, the primary objective is to remove competing and hybridizing nonnative fish species that occur within these selected waters. This action is needed because nonnative fish species continue to threaten CRCT populations through competition and hybridization. This action is important to meet the objective identified in the Conservation Strategy to "Secure or enhance CRCT populations" by removing nonnative fish species. To accomplish this objective, the Agencies would remove all fish from the project area prior to restocking with genetically pure CRCT.

This action responds to the goals and objectives outlined in the Ashley National Forest Plan, and helps move the project area towards desired conditions described in that plan (Ashley National Forest LRMP 1986). A Pesticide Use Proposal (PUP) as well as a National Pollutant Discharge Elimination System (NPDES) permit approved by the Regional Forester would be required to allow application of the piscicide to targeted waters within wilderness. This proposed project would not require a Forest Plan amendment.

Establishing populations of CRCT free from the threats of nonnative fish within the High Uintas Wilderness would greatly benefit CRCT recovery efforts within the species historic range, which includes portions of Utah, Wyoming and Colorado. The project would contribute to the conservation of the species and reduce the potential need for Federal protection under the Endangered Species Act.

The project is designed to meet the following Forest-wide standards and guidelines, and Management Area direction:

Land and Resource Management Plan (Forest Plan)

Wilderness

Objective 3. Manage wildlife, fish, range and watershed resources in conformance with the Wilderness Act.

- Reestablish native species classified as sensitive, threatened or endangered (IV-25)

Wildlife and Fish

Objective 1. Develop and implement habitat management plan that will include key ecosystems and maintain habitat for supporting T&E or sensitive plants and animal species and management indicator species.

- Identify and manage habitats capable of supporting self-sustaining trout populations.

Objective 3. Manage the habitat of all T&E or sensitive plant and animal species to maintain or enhance their status.

- Resource management activities will be allowed if they will not adversely affect any T&E or sensitive species.

Objective 5. Develop support from wildlife interest groups for funding or labor for wildlife and fish projects.

- Maintain contacts with local and regional wildlife and fish interest groups.

Proposed Action

The action proposed by the Ashley National Forest (Forest) and Utah Division of Wildlife Resources (UDWR) to meet the purpose and need is to implement a long term strategy to treat selected waters within the High Uintas Wilderness with piscicide (rotenone). Treatment is needed to remove all fish including nonnative brook trout, Yellowstone cutthroat trout and hybrid cutthroat trout. Treated waters would then be restocked with native CRCT. The UDWR, being the agency responsible for the management of fish populations, would take the lead in implementing the treatment project within target waters of the proposed project areas. The Forest would assist as the agency responsible for management of fish habitat. The lakes and streams proposed for treatment are located within the headwaters of the Rock Creek, Lake Fork River and Yellowstone River drainages. Implementation would potentially begin during the summer or fall of 2014. Treatment of all identified target waters is expected to require 10 – 15 years to complete.

There are over 1,000 natural lakes and over 400 stream miles within the Uinta Mountains. The waters proposed for treatment, including 14 lakes and 64 stream miles, are located

within three drainages on the south slope of the Uinta Mountain range. The proposed project area is primarily composed of headwater streams flowing through sub-alpine meadows and lakes within glacial moraines. Within these drainages, strategically selected lakes and streams would be treated (table 1).

The location of this project is approximately 35 miles north of Duchesne, Utah.

Legal description of project area:

Rock Creek – Fall Creek (T4N R7W Sections 21, 22, 23, 27, 28, 29, 32 and 33; T3N R7W Sections 5, 8 and 9)

Lake Fork River – Fish Creek (T2N R5W Sections 4, 5, 7, 8 and 18; T3N R5W Sections 28, 29, 32 and 33)

Lake Fork River – Ottoson Basin (T4N R7W Sections 25 and 36; T3N R7W Section 1; T4N R6W Sections 30, 31 and 32; T3N R6W Sections 4, 5, 6 and 9)

Lake Fork River – Oweep Creek (T3N R6W Sections 3 and 10; T4N R6W Sections 13, 14, 15, 22, 23, 24, 26, 27 and 34)

Yellowstone River – Garfield Basin (T1S R5W Sections 17, 18, 19, 20, 28, 29 and 30)

Yellowstone River – Swasey Hole (T3N R5W Sections 7, 8, 9, 16, 17, 18, 21, 22 and 23)

The waters proposed for treatment include 64 miles of stream and 275 lake acres, all located within the High Uintas Wilderness with the exception of approximately 5 miles of lower Fish Creek (table 1; figure 1).

Table 1. Summary of proposed treatment areas including estimated stream miles and lake acres to be treated

Drainage/Area	Stream miles	Lakes	Lake Acres
Rock Creek			
• Fall Creek	15	Phinney, Anderson and several small lakes ponds and seeps.	22
Lake Fork River			
• Fish Creek	10	Toquer Lake, four small lakes and several small ponds and seeps in the area.	9
• Ottoson Basin	10	Upper Ottoson, Lower Ottoson, X-89, Amoeba and several small ponds and seeps.	37
• Oweep Creek	15	One small lake and several headwater ponds and seeps.	3
Yellowstone River			
• Garfield Basin	8	Superior, Little Superior, Doll, Five Point, Gem and several small ponds/lakes and seeps.	162
• Swasey Hole	6	Swasey Lakes and several small ponds and seeps.	43
Total	64	**Total**	275

Implementation of the proposed treatment project would require crews to camp near the target waters. All prohibitions and special orders applying to the High Uintas Wilderness would be adhered to. This includes but is not limited to special orders related to group size, camp locations and areas closed to campfires. This project would request an authorization to use small electric trolling motors to disperse rotenone across lakes and an auger powered by a small gas generator to dispense potassium permanganate to neutralize rotenone at the downstream end of the proposed treatment areas. The use of motorized and mechanized equipment is listed in Section 4(c) of the Wilderness Act as a prohibited use. The Regional Forester can authorize requested Section 4(c) prohibited uses through the preparation of the required Minimum Requirements Decision Guide (MRDG) to identify the minimum activity necessary to successfully meet the proposed project objectives. Activity in the area during the treatment, other than the potential use of mechanized and motorized equipment, would not exceed that currently permitted by public wilderness recreationists. The actual dispensing of rotenone, which would require the most man-power, would occur over a short one to two day period in the summer or fall of each year. Crew members would be spread out at approximately one-half mile intervals along streams targeted for treatment. Crew members would be most concentrated at lakes targeted for treatment.

Treatment and neutralization of target waters would occur over a one to two-week period during summer and fall (July – September) each year. The first waters targeted for treatment could potentially be treated during the summer and fall of 2014. Each target water would be treated at least twice (once each year for two consecutive years) to ensure complete removal of the fish population. A second treatment is necessary to remove any fish that may have hatched from eggs present during the first treatment the previous year. A third treatment may be necessary depending on results of post treatment surveys. Therefore, treatment of waters within a selected basin would occur over a two to three-year period. The treatment of all selected waters as planned is estimated to take approximately 10 – 15 years to complete.

The effective dispersal and neutralization of rotenone would likely require motorized and mechanized equipment. The use of rafts equipped with electric trolling motors is proposed to ensure effective dispersal of rotenone on lakes. The dispensing of rotenone into lakes and streams would occur over a one to two day period for each treatment. The use of a generator-powered auger is also proposed in order to effectively dispense potassium permanganate to neutralize rotenone at the downstream end of the proposed treatment area. The neutralization process through dispensing potassium permanganate into the stream could require several days to two weeks depending on many factors affecting the rate rotenone is degrading in the system.

Concentrations of dead fish in accessible areas would be collected and buried. Any remaining dead fish would be washed downstream, consumed by scavenging wildlife or provide needed nutrients for repopulating aquatic macroinvertebrates.

Under the Proposed Action, the Agencies would:

1. Complete pre-treatment biological surveys and monitoring of fish, amphibians and aquatic macroinvertebrates.
2. Remove all fish from selected streams and lakes within the selected headwater basins using piscicide (rotenone).
3. Neutralize the rotenone downstream to the 30-minute time mark below the selected treatment reach using potassium permanganate.
4. Restock the Project area with pure CRCT fingerlings obtained from the well-developed South Slope brood stock held in Sheep Creek Lake.

Decision Framework

Given the purpose and need, the deciding official reviews the Proposed Action, the other alternatives, and the environmental consequences in order to make the following decisions:

Whether to allow the use of rotenone to remove nonnative fish species from selected waters within the High Uintas Wilderness.

Whether to allow the use of required motorized and/or mechanized equipment to disperse and neutralize rotenone within the High Uintas Wilderness.

Public Involvement

The Notice of Intent (NOI) was published in the Federal Register on July 6, 2010. The NOI asked for public comment on the proposal from July 6, 2010 – August 5, 2010. In addition, as part of the public involvement process, the agency published a notice requesting scoping comments in the newspaper of record (Salt Lake Tribune) on May 3, 2010.

On April 27, 2010, the Ashley National Forest mailed a scoping letter and a project area map to affected landowners, tribes, concerned citizens, special interest groups, local governments and other interested parties to comment on the scope of the Proposed Action. This information was also made available on the Ashley National Forest Web site at http://www.fs.fed.us/r4/ashley/projects/ and posted on the Forest's quarterly Schedule of Proposed Actions (SOPA) at this time.

On August 16, 2010, the Agencies met with the Duchesne County Commissioners to discuss the proposed project in more detail, especially how it would affect future recreational fishing opportunities.

Twenty-three comments were received in response to scoping and are included as part of the project record. Of the 23 comments received, 16 came from the general public, three from special interest groups, two from counties and two from agencies. These comments were used by the interdisciplinary team to developed a list of issues to address (see *Issues* section).

Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the Proposed Action. Non-significant issues were identified as those: 1) outside the scope of the Proposed Action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…". A list of non-significant issues and reasons regarding their categorization as non-significant may be found at the Roosevelt/Duchesne District Office in the project record.

As for significant issues, the Forest Service identified the following issues during scoping. These issues are used to gauge effects throughout the analysis. Generally, significant issues trigger alternative development, however, the interdisciplinary team responded to these issues through appropriate mitigation measures and no alternative development was necessary.

Issue #1: The potential long-term and irreversible damage to stream ecosystems and loss of other non-target native species resulting from treating with rotenone and neutralizing with potassium permanganate.

Fish, macroinvertebrates and early lifestages of amphibians are sensitive to rotenone and potassium permanganate. Treating proposed waters with rotenone and then neutralizing

rotenone-treated water with potassium permanganate could potentially result in long-term and irreversible loss of non-target native species.

Issue #2: Effects of implementing the proposed action, including the use of motorized or mechanized equipment to disperse and neutralize rotenone, on wilderness character and recreation.

Small electric motors are proposed to be used on rafts to enable efficient distribution of rotenone within lakes. In addition to these electric motors, small gas-powered generators are proposed to be used to effectively operate an auger to dispense potassium permanganate which will neutralize rotenone-treated water. The use of mechanized and motorized equipment would temporarily affect naturalness and the quality of wilderness recreation for visitors within the proposed project area. The use of motorized or mechanized equipment may be seen or heard by wilderness visitors and may be perceived by some as failing to comply with the Wilderness Act.

Issue #3: Impacts to fishing opportunities and expected timelines for the fishery to recover.

Rotenone treatment of target waters is intended to remove all fish. At least two treatments would occur in consecutive years to ensure complete fish removal. CRCT fingerlings would be restocked during the summer following the second treatment (or the third treatment if necessary) and would require at least one growing season to reach catchable size. As a result, fishing opportunities would be impacted during this three to four year time period between initial treatment and the time it takes re-stocked CRCT to reach catchable size. Fishery recovery of treated waters would require additional time and the timeline would be dependent on stocking rates, habitat and other environmental conditions.

Issue #4: Effect of the change in fishery management (brook trout replaced by cutthroat trout) on wilderness values and recreation use.

The Proposed Action would result in a change in fishery management. Generally more abundant and often stunted nonnative brook trout populations would be replaced with likely less abundant and larger native CRCT. This change in fishery management may affect wilderness values and recreation use.

Issue #5: Effects of rotenone treatment and neutralization using potassium permanganate on water quality, particularly its effect on municipal water supplies.

The Proposed Action of treating waters with rotenone and neutralizing rotenone-treated waters by applying potassium permanganate at the downstream end of the treatment area would affect water quality. This includes waters within a municipal watershed.

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Introduction

This chapter describes and compares the alternatives considered for the proposed High Uintas Wilderness Colorado River Cutthroat Trout Habitat Enhancement Project. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternatives Considered in Detail

The Forest Service developed two alternatives, including the No Action and Proposed Action alternative.

Alternative 1: No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No use of the chemical rotenone would be implemented to accomplish project goals. Fish would continue to be stocked to support recreational fishing and conservation efforts.

Alternative 2: The Preferred Alternative

The Ashley National Forest proposes to implement a long-term strategy to treat selected lakes and streams within the High Uintas Wilderness and one stream (Fish Creek) outside of the wilderness (table 1; figure 1) with piscicide (rotenone) to remove competing and hybridizing nonnative trout species. The proposed action alternative to treat target waters with piscicide would first require a UPDES pesticide use permit from the Utah Division of Water Quality.

The proposed project area encompasses three drainages within the High Uintas Wilderness, including the Yellowstone River, Lake Fork River and Rock Creek drainages. Within these drainages selected lakes and streams would be treated to remove all fish. No aircraft would be used to transport equipment and supplies. Equipment and supplies required to accomplish project goals would be transported by pack stock. The use of rafts equipped with electric trolling motors is proposed for use on lakes to disperse rotenone to all areas of lakes. An auger powered by a small gas generator would be necessary to effectively dispense potassium permanganate to neutralize rotenone-treated water at the downstream boundary of the project area. Treated waters would be restocked with CRCT from the well-developed brood stock held in Sheep Creek Lake the year following the last treatment of the selected water.

July through September is the target period each year to treat the selected basin, with the objective of treating prior to brook trout fall spawning (the hatch would provide a new population of brook trout to compete with CRCT). Also, most if not all amphibian species would have metamorphosed into adult life forms reducing their chance of exposure to rotenone during the proposed treatment. The prescribed time period is also a period of low base stream flow, allowing for less chemical to be used.

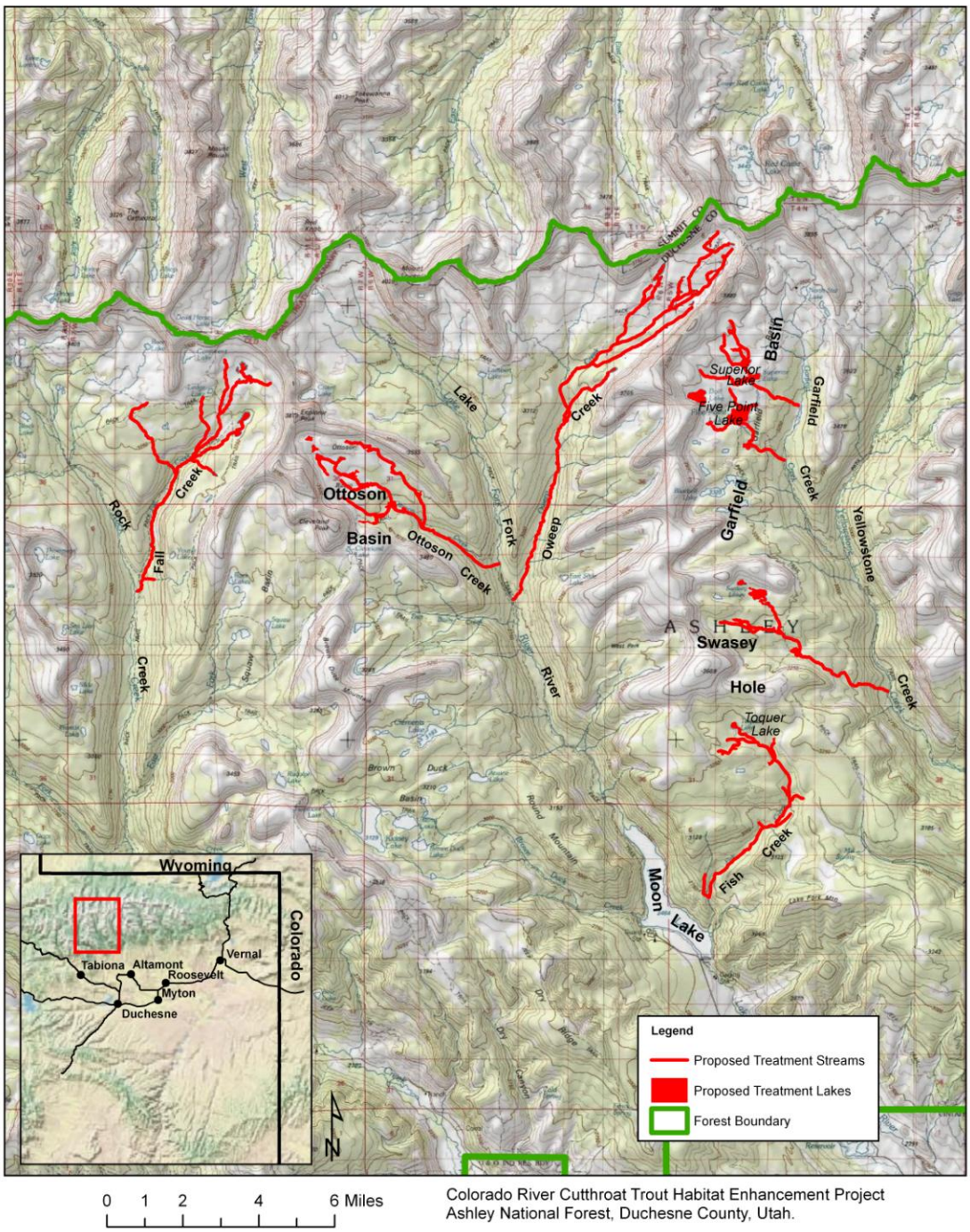
Rotenone liquid would be applied up to a concentration of 1.0 ppm of product (5% active ingredient). However, the minimum concentration needed to remove target species would be used. All target waters to be treated that year would be treated with rotenone during a one to two-day period. Lakes and streams would be treated a minimum of two times. This would likely be completed in consecutive years but could be within the same year. If two treatments occur within the same year, there would be one to two months time between treatments.

Liquid emulsifiable rotenone would be used to treat the flowing water sections following procedures outlined in the Rotenone SOP Manual (Finlayson et al. 2010). Rotenone would be applied at the rate of 0.5 – 1.0 ppm of product from drip stations located at approximately 0.5 – 1.0 mile intervals for a 6-hour period. Pressurized backpack sprayers would also be used to apply chemical to springs and backwater areas containing fish not effectively treated by drip stations. A small amount of sand and gelatin mixed with powdered rotenone (7.5 % Active Ingredient), may be used to treat small side tributaries or swamps. Florescent dye may be added to the water as the dripping begins to determine distribution and timing of rotenone reaching the next station or the bottom of the treatment area and neutralization station. Sentinel fish would be placed in live cages at strategic locations along the stream to monitor the effectiveness of the treatment. A bioassay would be run on the rotenone prior to the treatment to verify its degree of toxicity. Some adjustments may occur during the treatment depending on site conditions and observations.

Procedures outlined in the Rotenone SOP would be followed for neutralizing rotenone-treated waters. Potassium permanganate would be dispensed at or near the fish migration barrier at a concentration ratio of approximately 2:1 (potassium permanganate: rotenone) to neutralize rotenone and prevent mortality of non-target organisms beyond target treatment areas.

Powdered potassium permanganate (Cariox, EPA Registration Number 8429-9) would be used as a neutralizing agent for the rotenone. The application rate of potassium permanganate ($KMnO_4$) would be determined after the pre-treatment factors of water temperature and hardness are measured. As identified in the Rotenone SOP, the application rate of potassium permanganate applied at the bottom of the target treatment area would range between 1.0 and 3.0 ppm. The neutralization zone for the project would be approximately the 30-minute travel distance from the location potassium permanganate is dispensed into the stream. Neutralization of rotenone would take an estimated one to two weeks. The rate of neutralization is dependent on temperature and other factors such as stream gradient and water chemistry. Continuous use of the auger and gas powered generator would be necessary during this one to two week time period.

Figure 1. Waters proposed for treatment to enhance habitat for Colorado River cutthroat trout in the High Uintas Wilderness



Colorado River Cutthroat Trout Habitat Enhancement Project
Ashley National Forest, Duchesne County, Utah.

Mitigation Measures

The Forest Service also developed the following mitigation measures to be used as part of Alternative 2. Finlayson et al. (2010) recommend several measures to fishery managers applying rotenone for fish eradication projects in mountain streams to maximize treatment efficiency on fish and to minimize impacts to non-target aquatic invertebrates. These measures are included here as mitigations:

- Apply rotenone at treatment rates between 25 and 50 µg/L.
- Operate rotenone drip stations for 4-8 hours duration per treatment.
- Use unsynergized formulations because the synergized formulation is less toxic to fish and more toxic to aquatic insects.
- For chemical treatments of larger drainages, stage treatments with intermediate barriers and allow time between treatments for dispersal and re-colonization of invertebrates to avoid potential cumulative impacts.
- Leave headwater reaches of drainages that are above barriers and are naturally fishless as untreated refuges for invertebrates and a source for recolonization of downstream treated reaches.
- Neutralize rotenone downstream of project area.
- Strategically use caged sentinel fish and collect water samples for rotenone content throughout the treatment area to monitor efficacy.
- Conduct application of rotenone during the fall. Applications during the fall may further minimize effects on invertebrate communities and facilitate rapid recovery (Melaas et al. 2001).
- Confine activities to existing trails and stream access points to the extent practical to minimize disturbance of vegetation and potential cultural resources.
- The immediate treatment area would be closed to the public during treatment activities and application of rotenone.
- Lakes and streams treated with rotenone should remain closed to public use until water sampling or bioassay demonstrates that rotenone levels have reduced below 40 ppb.
- Follow Leave-No-Trace guidelines.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the scoping letter and NOI did not include specific suggestions for alternative methods for achieving the purpose and need.

Methods that have been used to remove fish, other than chemical removal, include the use of hoop nets seeded with mature fish, gillnets, and electrofishing. The efficiency of using hoop nets to remove adult brook trout was examined by Lamansky et al. (2009). Hoop nets were seeded with adult brook trout in an effort to draw other adult brook trout into the nets. This method resulted in low levels of removal compared with chemical and electrofishing methods designed to completely eradicate brook trout (Gresswell 1991; Kulp and Moore 2000). This method would be suitable for removing a portion of the population but would not meet the goal of total eradication of brook trout.

Gillnets are commonly used in fisheries management to sample fish populations of standing waters in lakes, reservoirs and ponds. The removal of all fish from the selected lakes and ponds would require a full season of netting at least to remove a major portion of the fish population. It is very likely some fish would remain in the lake following intensive gillnetting. Studies show it would likely take several years of intensive gillnetting to deplete the population to undetectable levels. The remaining fish would then become the source for populations to build and begin to compete or hybridize with native CRCT.

Electrofishing would require several passes with complete coverage of all areas of potential fish habitat in an attempt to remove all fish. Electrofishing has been successful at completely removing brook trout (Shepard et al. 2002) and rainbow trout populations (Kulp and Moore 2000) in small isolated stream reaches with relatively simplified habitat. The level of effort required to remove the population depends on several factors, including stream size, length and habitat complexity. Kulp and Moore (2000) successfully removed a rainbow trout population within one summer following four removal passes. However, even in a small stream with relatively simple habitat, it required eight years using multiple electrofishing passes to completely remove a brook trout population (Shepard et al. 2002). Logistically, this method of removal would require much more manpower over a much longer period of time; and because of the extent and complexity of habitat, would be virtually impossible to eradicate the fish population using electrofishing alone. Electrofishing works well as a sampling method, but is ineffective at removing all fish from target waters (Birchell 2007, Meyer et al. 2006). Any nonnative fish remaining would reproduce and re-build populations to levels which would then out-compete and prey on CRCT.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2. Comparison of effects of the No Action and Proposed Action alternatives for the High Uintas Wilderness Colorado River cutthroat trout habitat enhancement project

	No Action	Proposed Action
Progress toward meeting Goals and Objectives identified in the Forest Plan		
a) Manage habitat to enhance sensitive species status.	No. Continues to threaten sensitive species habitat.	Yes. Enhances habitat for CRCT.
b) Reestablish native species classified as sensitive, threatened or endangered.	No. Does not reestablish native species.	Yes. Reestablishes native species to approx. 64 stream miles and 275 lake acres.
Achieves objectives identified in the Conservation Strategy		
c) Secure and enhance conservation populations.	No. Leaves CRCT pop. vulnerable to effects of nonnative species.	Yes. CRCT populations secured and enhanced through removal of nonnative species.
d) Remove nonnative fish species.	No. Nonnative brook trout would not be removed.	Yes. Brook trout would be removed from approx. 64 stream miles and 275 lake acres.

Table 2 (cont.). Comparison of effects of the No Action and Proposed Action alternatives for the High Uintas Wilderness Colorado River cutthroat trout habitat enhancement project

	No Action	Proposed Action
Responds to major issues		
Issue #1: The potential long-term and irreversible damage to stream ecosystems and loss of other non-target native species resulting from treating with rotenone and neutralizing with potassium permanganate.	Yes, but does not remove nonnative fish or enhance CRCT habitat.	Yes. Mitigation measures would minimize or avoid long-term effects and irreversible damage. There is the potential for long-term removal of rare macroinvertebrate taxa within treatment areas. However, because these habitats are common across the Uinta Mountains and there are no known rare, threatened or sensitive macroinvertebrate taxa on the Forest long-term removal of rare taxa is very unlikely.
Issue #2: Effects of implementing the proposed action, including the use of motorized or mechanized equipment to disperse and neutralize rotenone, on wilderness character and recreation.	Yes. No motorized or mechanized equipment would be used.	Yes. Using minimum required tool would minimize effects to wilderness values. Mechanized and motorized equipment would be present in the wilderness along with associated noise.
Issue #3: Impacts to fishing opportunities and expected timelines for the fishery to recover.	No. Although no action would respond to this issue by not having an immediate impact on fishing opportunities, it would allow the continued trend toward a less natural nonnative fishery. Current fishing opportunities would remain and would not require fishery to recover.	Yes. Would enhance naturalness of the wilderness and provide a native trout fishery. The fishery is expected to take 4 – 5 years to recover and attain fish of catchable size. Treatment would result in reduction of fishing opportunities until fishery recovers. This would likely cause anglers to seek out alternate areas to fish.

Table 2 (cont.). Comparison of effects of the No Action and Proposed Action alternatives for the High Uintas Wilderness Colorado River cutthroat trout habitat enhancement project

	No Action	Proposed Action
Issue #4: Effect of the change in fishery management (brook trout replaced by cutthroat trout) on wilderness values and recreation use.	No. The fishery would continue to be managed with brook trout. Wilderness values and recreation use may be negatively impacted through continued proliferation of stunted brook trout.	Yes. Wilderness values and recreation opportunities would be enhanced by removing stunted nonnative fish populations and replacing with native cutthroat trout populations.
Issue #5: Effects of rotenone treatment and neutralization using potassium permanganate on water quality, particularly its effect on municipal water supplies.	Yes. Rotenone or potassium permanganate would not be used.	Yes. Because rotenone would be neutralized effects to water quality are not expected outside the project area.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter.

Aquatic Biological Resources

This section describes the existing aquatic biological resources associated with the selected treatment areas and assesses the potential impacts of the Proposed Action and No Action alternative on those resources. Aquatic biological resources, for the purpose of this assessment include fish, aquatic macroinvertebrates, and amphibians.

This analysis of effects incorporates information presented in the Biological Assessment, Biological Evaluation and Aquatic Specialist Report. These documents include an assessment and evaluation of the potential effect of the Proposed Action on threatened, endangered and sensitive species that may occur within the selected treatment areas. Aquatic species evaluated in the Biological Assessment include Colorado pikeminnow *(Ptychochelius lucius)*, razorback sucker *(Xyrauchen texanus)*, bonytail *(Gila elegans)* and humpback chub *(Gila cypha)*. Aquatic species evaluated in the Biological Evaluation include Colorado River cutthroat trout *(Oncorhynchus clarki pleuriticus)*, boreal toad *(Bufo boreas boreas)* and Columbia spotted frog *(Rana luteventris)*.

Affected Environment

The High Uintas Wilderness is located in the wild core of the massive Uinta Mountains of northeastern Utah and is characterized by the highest peaks in Utah, countless lakes,

and a unique alpine ecosystem. The Uinta Mountains are an east-west trending mountain range carved by glaciers from an immense uplift of Precambrian rock. Massive secondary ridges extend north and south from the crest of the range, framing glacial basins and canyons far below.

The Uinta Mountains rise from 7,500 to 13,528 feet at the summit of Kings Peak, offering diverse habitat for a wide variety of flora and fauna. Above treeline, tundra plant communities thrive in the harsh climate of the highest altitudes. Thick forests of Engelmann spruce, subalpine fir, and lodgepole pine blanket the land below treeline. Forested areas are interrupted by park-like meadows and lush wetlands. In the lower elevations, aspen groves and countless mixed species offer contrast to the scene.

There are over 1,000 natural lakes and over 400 stream miles within the Uinta Mountains. The waters proposed for treatment, including 64 stream miles and 14 lakes, are located within three drainages on the south slope of the Uinta Mountain range. The proposed project area is primarily composed of headwater streams flowing through sub-alpine meadows and lakes within glacial moraines.

Fish were initially stocked in the Uinta Mountains with the use of pack animals. Brook trout were stocked with the use of pack horses as early as the 1880's. Since their introduction, brook trout have readily spawned in the wild and populations have expanded upstream into the headwaters of many of the drainages of the Uinta Mountains and the High Uintas Wilderness. The use of pack horses for stocking mountain lakes meant that only a few lakes could be stocked each year. Since 1955, aircraft have been used for stocking remote lakes, greatly increasing the number of waters stocked each year. Brook trout and cutthroat trout are the predominant species stocked as they have demonstrated an ability to grow and survive well in these alpine lakes. However, other species such as rainbow trout, golden trout, and arctic grayling, have also been stocked into several Uinta Lakes.

The first comprehensive lake study undertaken by the Utah Department of Fish and Game began in the summer of 1955. A second comprehensive lake study was initiated by the Utah Division of Wildlife Resources in 1971 to evaluate past management efforts and stocking programs to recommend appropriate changes. Since the 1971 surveys, management efforts have been monitored regularly to evaluate condition and survival of fish populations.

Current Management

Most High Uintas Wilderness lakes containing fish are regularly stocked. Lakes that receive heavy pressure are stocked annually, while more remote lakes are stocked on a three to five year cycle. Remote lakes are stocked with fingerling sized fish by aircraft. The fisheries of many of these lakes are dependent on the stocked fingerlings being able to overwinter and grow to catchable sizes. However, many lakes are able to be self-sustaining through natural reproduction following stocking and then require very little stocking thereafter.

Aerial stocking is designed to replenish fish populations for recreational fishing and conservation efforts. The optimal growing season for fish at these high elevation lakes is very short and growth is relatively slow. Trout in these lakes rarely reach 12 inches by the third year of life.

Concern over the continued stocking of nonnative fish species within the High Uintas Wilderness has been expressed by individuals and environmental groups. Currently, species that were historically stocked prior to the designation of the High Uintas Wilderness in 1984 and are known to survive may be considered indigenous and continue to be stocked within the High Uintas Wilderness (AFWA 2006). Brook trout and arctic grayling are two nonnative species currently being stocked that survive well and provide variety in recreational fishing opportunities of the High Uintas Wilderness. Native CRCT are regularly stocked in many lakes within the wilderness and across the south slope of the Uinta Mountains for conservation efforts as well as for recreational fishing.

The affected area in this proposed project includes the Rock Creek, Lake Fork River and Yellowstone River drainages from the headwaters downstream to the mainstem rivers. In the Rock Creek drainage, this would include the drainage area upstream from the confluence of Fall Creek with Rock Creek with the proposed treatment of 15 stream miles and 22 lake acres. In the Lake Fork River drainage, this would include the Ottoson Basin from the confluence of Ottoson Creek and Lake Fork River and the proposed treatment of 10 stream miles and 37 lake acres; Oweep Creek confluence and Lake Fork River and the treatment of 15 stream miles and three lake acres; and the Fish Creek drainage area east of Moon Lake including Toquer lake for a treatment of 10 stream mile and 9 lake acres. The affected area within the Yellowstone River drainage would include the Garfield Basin, including Garfield Creek to the confluence with the Yellowstone River and would treat 8 stream miles and 162 lake acres and the Swasey Hole area downstream to the confluence with the Yellowstone River and would treat 6 stream miles and 43 lake acres (table 2 and figure 1). Over the life of the proposed project, an estimated 64 stream miles and 275 lake acres are proposed to be treated to remove nonnative fish and enhance CRCT habitat.

Aquatic resources are very abundant within the headwaters of these drainages. Headwater lakes and streams are very popular destinations for anglers and other users of the High Uintas Wilderness. Most users of the High Uintas Wilderness Area engage in fishing activities on their trips to the backcountry and headwater basins. Aquatic habitat within these wilderness settings are considered to be near optimal. Recreation and grazing impacts in these areas are minimal.

Species Overview

Threatened and Endangered Species

The Forest Service identified a list of four federally listed endangered fish species that could be potentially affected by the Proposed Action based on a December 2012 list obtained from the U.S. Fish and Wildlife Service (USFWS; table 3). The humpback chub, bonytail, Colorado pikeminnow, and razorback sucker are all native to the Colorado River Basin (USFWS 2002 a, b, c, and d). Each of these species are listed as endangered by the USFWS and currently do not occur within the Ashley National Forest. There is no suitable habitat in the project area (USFWS 2002 a, b, c, and d). Suitable habitat for these fish species occurs in the larger and turbid Duchesne and Green Rivers, which are over 30 miles downstream within drainages of the proposed project area.

Sensitive Species

One fish and two amphibian species are listed as sensitive by the R4 Regional Forester on the Ashley National Forest on a list updated December 2012. These include the Colorado River cutthroat trout *(Oncorhynchus clarki pleuriticus)*, boreal toad *(Bufo boreas boreas)* and Columbia spotted frog *(Rana luteventris;* table 3**).**

Management Indicator Species (MIS)

Cutthroat trout and aquatic macroinvertebrates were selected as MIS on the Ashley National Forest as indicators of aquatic habitat quality (table 3). Cutthroat trout *(Oncorhynchus clarki* spp.*)* were selected for the following reasons:

a) It is the fish species on the Forest most sensitive to changes in its environment and is indicative of management effects on other fish species.
b) It typically inhabits key reaches of streams where most management activities are or will be occurring.
c) It is the only trout on the Forest that is recognized as native.
d) It reproduces naturally in most Forest streams and is stocked in several lakes on the Forest.

Macroinvertebrates were chosen as MIS for the following reasons:

a) The wide range of conditions they monitor.
b) Their relatively large size which facilitates identification.
c) Their limited mobility restricts them to a particular environment.
d) They have a lifespan of months or years which allows for monitoring response to impacts over time.

Other Species

In addition to TES species and Forest MIS, potential effects to boreal chorus frogs *(Pseudacris maculata)* and tiger salamanders *(Ambystoma tigrinum)* from the proposed project are also analyzed (table 3). Boreal chorus frogs and tiger salamanders are amphibians known to occur within and near the proposed project area.

Table 3. List of aquatic species considered and analyzed for the proposed High Uintas Wilderness Colorado River cutthroat trout habitat enhancement project

Species	Habitat within Project Area?	Potential Effects/ Analyzed Further
Threatened and Endangered		
Humpback chub *Gila cypha*	*No	No
Bonytail *Gila elegans*	*No	No
Colorado pikeminnow *Ptychochelius lucius*	*No	No
Razorback sucker *Xyrauchen texanus*	*No	No
Sensitive		
Colorado River cutthroat trout *Oncorhynchus clarki pleuriticus*	Yes	Yes
Boreal toad *Bufo boreas boreas*	Yes, but no known individuals or populations.	Yes
Columbia spotted frog *Rana luteventris*	Potential. No known individuals or populations.	Yes
MIS		
Cutthroat trout *Oncorhynchus clarki* spp.	Yes	Yes
Aquatic macroinvertebrates	Yes	Yes
Other		
Boreal chorus frog *Pseudacris maculata*	Yes. Populations occur within project area.	Yes
Tiger salamander *Ambystoma tigrinum*	Yes. Populations occur within project area.	Yes

* Suitable and occupied habitat is located over 30 miles downstream in the Duchesne River.

Sensitive Species

Colorado River Cutthroat Trout

Like most members of the trout family, cutthroat trout require clear, cold water, natural flow regimes, low levels of fine sediment, well-distributed pools, stable streambanks, and abundant stream cover. Cutthroat trout mature at 2 – 3 years of age and spawn after peak flows in spring or early summer in predominantly gravel substrate (Behnke 1992). Adult cutthroat trout require adequate pool habitat with depths of 0.3m or greater, and cover consisting of boulders, logs, overhanging vegetation or undercut banks. Over the last few decades, this species has been impacted by habitat fragmentation and displaced in many areas through competition with non-native trout.

CRCT are the only trout species native to the south slope of the Uinta Mountains (Behnke 1992). The U.S. Fish and Wildlife Service received a petition to list CRCT as threatened and endangered in December 1999. In April, 2004 the Fish and Wildlife Service determined CRCT were not warranted for listing. The petition process was

reinitiated in 2006 and in June of 2007 the USFWS again determined that federal listing was not warranted for this species.

The CRCT is managed under a multi agency conservation strategy and agreement, which was implemented for protection and conservation. CRCT are currently listed as a sensitive species on the Regional Forester's Sensitive Species List. The Ashley NF contains approximately 347 stream miles occupied by CRCT (table 4). Approximately 101 stream miles of currently occupied habitat are within the High Uintas Wilderness on the Ashley NF. Although CRCT are found well distributed across the Forest, fisheries survey data show they are in competition with and continue to be displaced by brook trout. CRCT are also threatened by hybridization with nonnative cutthroat subspecies (primarily Yellowstone cutthroat trout) and rainbow trout.

Currently, there are approximately 52 stream miles of habitat on the Forest occupied by CRCT that do not contain competing or hybridizing nonnative species. Survey data indicates the High Uintas Wilderness Area on the Ashley NF contains only nine stream miles of CRCT habitat free from nonnative fish species. The successful completion of this proposed project would provide CRCT with an additional 64 stream miles and 14 lakes (275 acres) free from the effects of nonnative fish species.

Table 4. Summary of stream habitat currently occupied by CRCT on the Forest and within the High Uintas Wilderness and the estimated amount enhanced following the completion of the proposed project.

	Stream miles on Forest	Stream miles within Wilderness
CRCT occupied streams	347	101
CRCT streams w/o nonnatives	52	9
CRCT habitat enhanced	64	62

Cutthroat trout populations are currently found scattered in headwater streams within the three drainages proposed for habitat enhancement. CRCT are currently stocked in several lakes within these drainage basins in support of recreational sportfishing opportunities within the High Uintas Wilderness. Most of these populations occur and are in competition with brook trout and hybridized cutthroat trout.

Colorado River Cutthroat Trout Competition with Brook Trout

High movement rates of brook trout contribute to invasion and frequent replacement of cutthroat trout in upstream habitats in the western United States. Because of this, brook trout invasions are viewed as a major impediment to cutthroat trout recovery. Although the underlying mechanisms are not well understood, the differences in life histories are likely what afford brook trout a competitive advantage over cutthroat trout. Some notable differences include age and size at maturity and spawn timing.

Brook trout can become reproductively mature as early as age-1; at a time when they are still relatively small. Because of this, rapid colonization of new areas is possible and areas that contain adequate spawning habit often become over-populated with stunted brook trout. On the other hand, cutthroat trout generally become reproductively mature at age-2 or age-3 and at a larger size than brook trout. This results in smaller cutthroat trout populations consisting of larger individuals. Because of this, in many habitats where brook trout and cutthroat trout are sympatric, cutthroat trout rapidly become outnumbered by invading brook trout.

The spawning period for these two species are months apart. Brook trout spawn in the fall with the fry emerging in the early summer and cutthroat trout spawn in the late spring or early summer and fry emerge in August. As a result, age-0 brook trout have a distinct size advantage over emerging cutthroat trout fry. Furthermore, brook trout have a size advantage going into the first winter. This is a definite advantage for over-winter survival. Studies conducted by Peterson et al. (2004) documented survival of age-0 cutthroat trout are negatively impacted by the presence and overabundance of age-0 brook trout.

Brook trout are known to feed both on drift and on food at or close to the bottom of the stream or lake, while cutthroat trout are primarily drift feeders. Brook trout also have the tendency to feed on their own eggs. Considering these tendencies, it is very likely brook trout regularly prey on cutthroat trout eggs which could affect recruitment when brook trout are present in high densities (McGrath and Lewis 2007).

Population data from McGrath and Lewis (2007) suggest that the displacement of cutthroat trout by brook trout occurs through a bottleneck on recruitment due to mortality at early life stages for cutthroat trout. Age-0 brook trout at mid-elevation streams survive at a much higher rate than age-0 cutthroat trout. No differences in survival were detected for age-1 or age-2 brook trout in any stream. Cutthroat trout appear to be unaffected by brook trout at older lifestages.

Boreal Toad

The boreal toad inhabits western Canada and much of the western (especially northwestern) United States and are listed as a state sensitive species in Utah. They are surveyed and monitored according to a monitoring plan developed by the UDWR in 2005 (Hogrefe et al. 2005). Boreal toads occur in isolated areas throughout most of Utah, and can be found in a variety of habitats, including slow moving streams, wetlands, desert springs, ponds, lakes, meadows, and woodlands. Boreal toads are noted to be relatively independent of water compared to other amphibians, but must re-hydrate daily (Hogrefe et al. 2005). Because of this, they are highly terrestrial and typically migrate to breeding sites, deposit egg strands, and return to upland burrows. The boreal toad, which is inactive during cold winter months, may either dig its own burrow in loose soil or use the burrows of other small animals. Additionally, burrows represent critical microhabitats for boreal toad and other amphibians, especially in warmer drier climates (Hogrefe et al. 2005).

Adults feed on numerous types of small invertebrates, such as ants, beetles, and grasshoppers, whereas larvae (tadpoles) filter algae from the water or feed on detritus. The breeding season of the boreal toad varies depending on geographic location, but generally occurs in the spring following ice off and continues into the early summer.

There are a few relatively minor threats to boreal toad populations and habitat in the Uinta Mountains. These threats include livestock grazing and wildfire. The threat of predation on boreal toads would primarily occur at the egg and larval stages, but boreal toad eggs and tadpoles are toxic or distasteful to most predators. It has been reported that even in the absence of other food, trout avoided eating boreal toad tadpoles in a Colorado hatchery (Pilliod and Peterson 2000).

Columbia Spotted Frog

The Columbia spotted frog ranges from southeast Alaska through Alberta, Canada, and into Washington, Oregon, Idaho, Wyoming, Montana, and disjunct areas of Nevada and Utah. In Utah, isolated Columbia spotted frog populations exist in the West Desert and along the Wasatch Front. Unfortunately, habitat degradation and loss have led to declines in many of these populations, especially along the Wasatch Front. With a goal of recovering the Columbia spotted frog, several government agencies are working cooperatively under a Conservation Agreement to eliminate or significantly reduce the threats facing the species.

The Columbia spotted frog breeds as early in the spring as winter thaw allows, with eggs hatching in 3-21 days, depending on temperature. The species seems to prefer isolated springs and seeps that have a permanent water source, although individuals are known to move overland in spring and summer after breeding. During cold winter months, spotted frogs burrow in the mud and become inactive. Adult frogs eat a wide variety of food items, ranging from insects to snails, whereas tadpoles eat algae, plants, and small aquatic organisms.

Threats to Columbia spotted frog populations include habitat loss and degradation. In the Uintas this could be from livestock trampling and grazing at or near springs and other suitable habitat. Introduction of nonnative aquatic species including brook trout can have negative effects on frog populations. Finally, chytrid fungus, which has been documented in populations in the Heber Valley (Bailey et al. 2006) and the Uinta mountains, can have detrimental impacts to local populations and spread to others.

Management Indicator Species

Cutthroat Trout

Habitat requirements, life history requirements, and threats to cutthroat trout are the same as those identified above for CRCT. Cutthroat trout populations, including remnant Yellowstone cutthroat trout *(Oncorhynchus clarki bouvieri)* are currently found scattered in headwater streams and mainstem rivers within the three drainages proposed for habitat enhancement. Nonnative subspecies of cutthroat trout are no longer stocked in the High Uintas Wilderness. CRCT are currently stocked in several lakes within these drainage basins for conservation efforts and in support of recreational sport fishing opportunities within the High Uintas Wilderness. Most of these populations occur and are in competition with brook trout.

Aquatic Macroinvertebrates

Benthic macroinvertebrates are aquatic animals without backbones that live on the bottom of freshwater habitats during all or part of their life cycle and that are large enough to be seen with the naked eye. Major groups of benthic macroinvertebrates include arthropods (i.e., crustaceans and insects), mollusks, sponges and nematode worms. The most abundant are typically immature life states (larvae) of aquatic insects such as mayflies, stoneflies, and caddis flies. The benthic macroinvertebrate community or “assemblage” is largely determined by the range of habitat conditions, such as water quality, vegetation structure and bottom substrate. More complex habitats generally support a more diverse assemblage than more uniform habitats.

Macroinvertebrate species monitored as Forest MIS include three mayfly, one stonefly, and one dipteran species (table 5). These species are but a sample of the species considered when aquatic macroinvertebrate samples are collected for evaluation of the aquatic system. The Forest has been collecting macroinvertebrate data on most major streams since 1975. Therefore baseline information is available.

Table 5. Forest macroinvertebrate MIS and associated habitat requirement and tolerance description

Species	Description
Mayfly *Epeorus* sp.	Requires good water quality and good instream habitat. Must have resident population.
Stonefly *Zapada* sp.	Depends upon allochthonous leaf litter for nutrients. Relative numbers generally indicate riparian habitat quality or quantity.
Mayfly *Ephemerella doddsi*	Requires good water quality and good instream habitat. Relative numbers can indicate habitat quality.
Mayfly *Ephemerella inermis*	Moderately tolerant to sediment. Good red-flag species when their numbers increase.
Dipteran Chironomidae	Highly tolerant to multiple forms of pollution. Particularly tolerant to sedimentation. Often dominate the community when pollution is severe.

All perennial water within the proposed project areas is considered suitable habitat for aquatic macroinvertebrates. Surveys of aquatic macroinvertebrates are an important tool in describing the condition and relative health of the watershed and of the aquatic ecosystem. As a food source, aquatic macroinvertebrates are essential to the growth and production of fish. Biotic Condition Indices (BCIs), derived from macroinvertebrate samples, stream substrate, stream gradient, alkalinity and sulfate are used to evaluate aquatic ecosystem conditions based on macroinvertebrate community tolerance levels and stream potential. The BCI is actually an index of percent of predicted. Therefore, BCI values can exceed 100 but usually range from 45 to 100. Generally, BCI values greater than 90 indicate excellent health of the stream ecosystem. In effect, higher BCIs (> 75), typically correlate with higher macroinvertebrate community diversity, which in turn, corresponds to greater habitat diversity and higher water quality.

The Forest Plan states that the BCI should remain above 75, which it has in streams that have been sampled and monitored. Macroinvertebrate monitoring occurs in the lower reaches of several watersheds to monitor conditions of the entire watershed. Results of samples taken during the 2011 season resulted in a BCI of 71 for Fish Creek and 90 for the Yellowstone River in 2008, indicating good aquatic ecosystem conditions (table 6).

This section reviews the general ecology of benthic macroinvertebrates. Benthic macroinvertebrates are an important biological resource for several reasons:

- Biodiversity value – they represent an extremely diverse group of aquatic animals.
- Food web support – they are an important part of the aquatic food web, including a primary food source for trout.
- Indicators of ecological health – benthic macroinvertebrates have diverse microhabitat requirements and ecological functions. They exhibit a wide range of responses to ecological changes and stressors, thus making them valuable indicators of water quality.

General Ecology

The benthic macroinvertebrate assemblage in streams encompasses a wide variety of taxa, but larvae of aquatic insects are often the most abundant. Aquatic insects are extremely diverse and highly variable; especially in headwater streams (Clarke et al. 2008). Macroinvertebrates with life stages that use aquatic habitats include dragonflies and damsel flies (Order Odonata), stoneflies (Order Plecoptera), mayflies (Order Ephemeroptera), caddisflies (Order Trichoptera), and true flies (Order Diptera). Ephemeroptera, Plecoptera and Trichoptera are the taxa generally most sensitive to changes in their environment (Mangum and Madrigal 1999).

Macroinvertebrate assemblages are generally quite similar among drainages across a mountain range. Composition of macroinvertebrate assemblages vary seasonally, annually, and as a result of natural processes (i.e. spring runoff, storm flood events etc.). Macroinvertebrate communities are remarkably consistent across great distances of the western United States. Similar species composition among coldwater streams is attributed to the fact that macroinvertebrate species have good dispersal mechanisms which allow them to disperse over great distances to colonize streams elsewhere (Bilton et al. 2001).

Most stream macroinvertebrates are benthic; meaning they are associated with the bottom of the stream channel, such as cobble, gravel, and finer substrates or other surfaces including roots or emergent aquatic vegetation. The hyporheic zone, where stream water and ground water meet below the substrate surface, often provides a protected microhabitat. The hyporheic zone serves as a refuge for benthic insects. This zone also provides a reservoir capable of recolonizing the surface benthos if depleted from floods, drought or extreme temperatures, and provides suitable conditions for immobile life stages such as eggs, pupae, diapausing nymphs, and larvae (Carvalho and Uieda 2006). Many stonefly species spend most of their lives in the hyporheic zone, returning to the main stream channel to emerge as adults (Hilsenhoff 1991).

The macroinvertebrate assemblage serves an important ecological function in stream food webs (Covich et al. 1999). Macroinvertebrates can be divided into several feeding guilds, or groups, that fill specific ecological niches such as shredders (feed on leaves and other organic matter), scrapers (feed on algae attached to leaves and rocks), filterers (collect food from water column), and predators (Hilsenhoff 1991). Because of their abundance and role in the aquatic food chain, benthic macroinvertebrates (insects in particular) are an important source of food for birds, mammals, amphibians, reptiles, fish, and other invertebrates.

Despite a lack of obvious connectivity among sites, many freshwater invertebrate taxa have broad geographical ranges. Most macroinvertebrates exhibit dispersal, or movement of individuals from one area or habitat patch to another (Bilton et al. 2001). Dispersal is also a key process in the recolonization of disturbed areas of streams. Dispersal and recolonization generally occurs by four primary routes. These include: downstream movement primarily occurring by drift, upstream movement along the substrate, colonization from subsurface or hyporheic zone and aerial colonization, with oviposition by winged adult insects being the primary mechanism (Mangum and Madrigal 1999). Drift is one of the most important mechanisms for dispersal to and colonization of downstream habitats (Carvalho and Uieda 2006, Smock 2006). The majority of species drift at night. Macroinvertebrates may actively disperse in search of suitable substrate or food, to escape from predators or competitors, to avoid environmental conditions (including pollution), or to reproduce. Other forms of dispersal include crawling and swimming both upstream and downstream. Macroinvertebrates can move between the surface strata and the hyporheic zone (Hilsenhoff 1991, Smock 2006). Streams may also be recolonized via aerial dispersal by egg-laying adults from nearby source populations. Additionally, recolonization can occur from emerging adults that fly upstream and downstream, as well as laterally to other drainages (Smock 2006). Carvalho and Uieda (2006) hypothesized different factors affecting one or more ways of dispersal and colonization may result in different community structure. Furthermore, these colonization routes are important mechanisms for recolonization of denuded areas.

Endemic species are species that are native to, and restricted to, a particular geographic region. Springs are known to harbor endemic species. Spring invertebrates can be unique because spring habitats are typically isolated from each other. Springs maintain consistent temperatures and may therefore harbor relict species that were more widespread in previous climate conditions.

Macroinvertebrates of Proposed Treatment Areas

The proposed treatment area contains diverse aquatic microhabitats for invertebrates in lotic (flowing water) and lentic (still water) environments. Microhabitats include riffles, pools, runs, backwaters, springs, and lakes, with a variety of substrates such as boulders, cobble, gravel, sand, logs, undercut banks, and vegetation. Stream habitat, substrate, and hydrology all influence macroinvertebrate community composition.

No endemic or rare taxa have been reported for the proposed treatment area. Current data on aquatic macroinvertebrates on the Forest has been obtained from samples collected in the mainstem streams and rivers within drainages proposed for treatment (table 6). The most recent samples were collected in 2011.

Table 6. Summary of macroinvertebrate repeated sampling efforts on the Roosevelt/Duchesne Ranger District

Stream	Years Sampled	Average BCI	Latest BCI
Rock Creek	88,89,90,92,93,08	80	88
N. fork Duchesne	87, 89,90,92,93,08	87	84
Uinta River	87,89,90,92,93,08	83	85
Whiterocks River	88,89,08	85	89

Yellowstone River	87,90,92,93,97,02,03,04,08	90	90
Fish Creek	11	71	71
South Unit			
L. Fork Indian Creek	08	111	111
Sowers Creek	08	113	113
Timber Creek	87,89,92,93,97,11	80	92

Special Status Macroinvertebrates

There are no federally endangered, threatened, or candidate macroinvertebrate species known to occur in the proposed project area or in the proposed treatment area. In addition, no Forest Service Region 4 sensitive macroinvertebrate species occur within the proposed project area or on the Ashley National Forest (USDA Forest Service 2010).

Other Species

Boreal Chorus Frog

The range of the boreal chorus frog includes much of Canada and the western and north-central United States. They are small frogs reaching 30 mm in length and are among the first amphibians to emerge in the spring, often while snow and ice are still present. They are found near permanent and temporary water in cleared land or forest. Breeding begins immediately after spring thaw. Chorus frogs breed in marshes, rain pools, pools formed by melting snow, bog ponds, glacial kettle ponds, beaver ponds, marshy edges of lakes and reservoirs, flooded areas, and other bodies of water with little or no current. They have been found up to 12,000 feet elevation in the Uinta Mountains. In the higher elevations of the Uinta Mountains including headwater areas within the proposed project area, breeding generally begins near late May or early June. Metamorphosis may occur as late as early September. Tadpoles are herbivorous and usually metamorphose within 60 days. Adults eat various insects and small invertebrates.

Tiger Salamanders

Tiger salamanders are the largest terrestrial salamander in the United States. Adults can reach lengths of 13 inches but typically grow to nine inches in overall length. Coloration is highly variable but "tiger-like" markings are usually present on the back and sides.

Tiger salamanders occupy a variety of habitats and are found in many areas from desert to mountains that have a suitable water body and substrates for burrowing. The adults are predominantly subterranean except during the breeding season and either excavate their own burrows or use those made by rodents. The species range is from mid-Alberta to Mexico and from the central California coast to the Missouri River.

Tiger salamanders breed early in the spring and begin migrations prior to ice off. They usually migrate at night during or shortly after rainstorms. Breeding areas usually do not contain predatory fish. Eggs can be found either attached to submerged objects or on the bottom. In the colder areas where the species is found, the larvae may over winter and can become neotenic and remain in the larval form.

Environmental Consequences

This section identifies and analyzes the potential direct and indirect effects on aquatic biological resources resulting from the No Action and the Proposed Action alternatives. Impacts to biological resources are evaluated based on both potential temporary and long-term impacts. This section analyzes effects to three Forest sensitive species which include CRCT, boreal toad and Columbia spotted frog; cutthroat trout and aquatic macroinvertebrates, which are forest MIS, and boreal chorus frog and tiger salamander as amphibian species known to occur within the proposed project area.

The two significant issues related to aquatic species identified from scoping include:

- Issue #1 - The potential long-term and irreversible damage to stream ecosystems and loss of other non-target native species resulting from treating with rotenone and neutralizing with potassium permanganate.
- Issue #3 - Impacts to fishing opportunities and expected timelines for fishery to recover.

Alternative 1: No Action

Sensitive Species

Colorado River Cutthroat Trout

This species is dependent on perennial, cool water with moderate to high water quality. The proposed project area contains suitable habitat for CRCT. The purpose of this project is to enhance habitat for CRCT by removing competing and hybridizing nonnative fish species (see aquatic specialist report for more specific information on the fisheries of the proposed project area).

Under the No Action alternative, the piscicide rotenone would not be used to remove competing and hybridizing nonnative trout. Nonnative brook trout would continue to out compete and replace native CRCT. The No Action alternative would not meet goals and objectives identified in the Conservation Strategy for Colorado River cutthroat trout and would increase the risk of CRCT being listed as threatened or endangered under the Endangered Species Act. CRCT would continue to be stocked to maintain conservation populations as well as provide opportunities for recreational fishing.

Under the No Action alternative, the threat of invading and competing brook trout populations would not be reduced. In the long-term, overpopulated and stunted brook trout populations would likely displace CRCT. In addition to invading brook trout, nonnative and hybridized cutthroat trout subspecies would remain in the proposed treatment areas and continue to hybridize with CRCT. This would continue to threaten the genetic integrity of CRCT populations within the High Uintas Wilderness.

Under the No Action alternative, there would be no short term impacts to the current fishery. However, over the long-term there would be a continued shift in the composition of the fishery toward an increase in waters containing fisheries consisting of stunted brook trout populations and fewer waters containing populations of native CRCT.

Boreal Toad

Currently, there are no known populations of boreal toad within or near the proposed project area. In addition there are no known populations of these amphibian species on the ANF. However, historical records indicate that boreal toads were once present in many locations on the Uinta Mountains within the ANF. Historical specimens were collected or reported from the Lake Fork River, Spirit Lake, Whiterocks River, Uintah River, and "Uinta Mountains" within the ANF (Day et al. 1997).

In 2009, Utah Division of Wildlife Resources (UDWR) crews observed two adult boreal toads in the Burnt Fork Drainage on the north slope of the Uinta Mountains within the High Uintas Wilderness on the Uinta-Wasatch-Cache National Forest (UWCNF). Two adult and several juvenile boreal toads were observed and photographed by UDWR and UWCNF crews conducting fisheries surveys in the Little West Fork Duchesne River drainage of the UWCNF on the south slope of the Uinta Mountains during the 2009 field season (Matt Breen – UDWR pers. comm. 2010). These recent boreal toad observations occurred over 20 miles from the proposed project area. Although no known populations of boreal toad occur within or near the proposed project area, suitable habitat in the form of small, shallow ponds, and lakes does occur within and near the proposed project area.

Under the No Action alternative, there would be no use of rotenone to remove the current fish population. As a result, there would be no direct effects to sensitive amphibian species. However, the potential negative effects on amphibians from the current fish population, primarily brook trout, would continue to persist within the drainages proposed for treatment. Many studies have identified the introduction of nonnative trout populations as the cause in the decline of various amphibian species in alpine lakes (Fellers and Drost 1993, Hecnar and M'Closkey 1997, Knapp and Matthews 2000, Maxell 2000, Pilliod and Peterson 2001, Pope 2008, Tyler et al. 1998, and Welsh et al. 2006). Brook trout would continue to impact amphibians directly by preying on larval and juvenile lifestages and indirectly through resource competition for available prey insects (Joseph et al. 2011) in habitats where they co-exist. However, as previously mentioned, boreal toad eggs and tadpoles are toxic or distasteful to most predators (Pilliod and Peterson 2000) and therefore would not be impacted by the presence of trout like other amphibians.

As discussed in the fish analysis, because brook trout are generally more mobile and reproduce at a younger age than cutthroat trout, they are more likely to reach higher densities and often result in stunted populations. These higher densities would result in greater predation and impacts to amphibian populations. This has likely altered the abundance and/or diversity of the historic, native amphibian community. These impacts would persist under the no action alternative.

Columbia Spotted Frog

Currently, there are no known populations of Columbia spotted frog within or near the proposed project area. In addition there are no known populations of this amphibian species on the ANF.

The nearest known spotted frog population occurs in the Provo River drainage and the Heber Valley (Bailey et al. 2006). Although no known populations of Columbia spotted frog occur within or near the proposed project area, potentially suitable habitat in the form of shallow off-channel pools and small isolated ponds or lakes does occur within

and near the proposed project area. As discussed above for boreal toad, the No Action alternative would result in the continued proliferation of stunted brook trout populations and subsequent negative impacts on native amphibian populations.

MIS

Cutthroat Trout

The effects to cutthroat trout are very similar to CRCT for the No Action alternative. Under the No Action alternative, the piscicide rotenone would not be used to remove competing and hybridizing nonnative trout. This includes Yellowstone cutthroat trout and their hybrids. Therefore, populations of cutthroat trout subspecies would remain and continue to threaten the genetic integrity of native CRCT.

Under the No Action alternative, brook trout populations would continue to outcompete and displace cutthroat trout. In the long-term, brook trout would likely displace cutthroat trout and result in many waters containing populations of stunted brook trout. In addition, nonnative and hybridized cutthroat trout subspecies would remain in the proposed treatment areas, which would continue to hybridize with CRCT, resulting in the continued decline in genetically pure CRCT populations within the High Uintas Wilderness.

Aquatic Macroinvertebrates

Under the No Action alternative, rotenone would not be used to remove fish. Temporary and potentially long-term impacts to stream ecosystems and aquatic macroinvertebrates would not occur. Aquatic macroinvertebrates would not be directly affected by rotenone treatment. Therefore, the No Action alternative would have no direct mortality on aquatic macroinvertebrates. In addition, water quality would not be subjected to any short-term degradation associated with rotenone treatment. However, under the No Action alternative, nonnative trout populations would continue to impact and influence aquatic ecosystems. High densities of brook trout would continue to impact aquatic macroinvertebrate abundance. However, this impact is not expected to degrade abundance or diversity to the point it no longer meets Forest standards for BCI.

Other Species

Amphibians (Boreal Chorus Frog and Tiger Salamander)

Stocking of fish in historically fishless high mountain lakes has been implicated in the decline of amphibian populations. Trout readily prey on early amphibian lifestages as well as juveniles and adults. Because of differing life history strategies, some amphibian species are more susceptible to predation than others. Species such as tiger salamanders, which may remain at the larval lifestage for more than one season, depend on deep lakes for overwinter survival. Amphibian species that remain in the larval lifestage longer are generally more susceptible to predation. Deep lakes are generally stocked with fish. Amphibian reproduction occurs in these lakes, yet few lakes containing abundant fish contribute to the amphibian population because of lack of young amphibians recruiting (Pilliod and Peterson 2000).

Under the No Action alternative, there would be no use of rotenone to remove the existing fish population from lakes and streams. As a result, there would be no direct

effects to amphibian species. However, the potential negative effects of abundant nonnative fish, primarily brook trout, would continue to persist within the drainages proposed for treatment. As mentioned in the sensitive amphibian section, many studies have identified the introduction of nonnative trout populations as the cause in the decline of various amphibian species in alpine lakes (Fellers and Drost 1993, Hecnar and M'Closkey 1997, Knapp and Matthews 2000, Maxell 2000, Pilliod and Peterson 2001, Pope 2008, Tyler et al. 1998, Welsh et al. 2006). Abundant, self-sustaining brook trout populations would continue to impact amphibians directly by preying on larval and juvenile lifestages and indirectly through resource competition for available prey insects in habitats where they co-exist (Joseph et al. 2011). High densities would be expected to result in greater predation on larval and juvenile amphibians and impact amphibian populations. This has likely altered the abundance and/or diversity of the historic, native amphibian community. These impacts to amphibians would persist under the No Action alternative.

Fishing Opportunities

Under the No Action alternative, there would be no short term impacts to the current fishery. Cutthroat trout would continue to be stocked to maintain conservation and recreational fishing populations. However, over the long-term there would be a continued shift in the composition of the fishery toward an increase in waters containing stunted brook trout populations. A fishery consisting of over-abundant stunted brook trout is generally less desirable to anglers than a balanced fishery containing fewer but larger fish.

Alternative 2: Proposed Action

Sensitive Species

Colorado River Cutthroat Trout

The use of rotenone within the proposed project area is intended to remove all fish in treated waters within the project area. Therefore, the proposed project would have a direct effect to the existing CRCT population in the short term as a result of removal of all fish. Following treatments, only CRCT fingerlings would be stocked into the enhanced habitat. In the long term, the proposed project would have indirect beneficial effects on CRCT populations and their habitat as the new CRCT population would flourish without the effects of competing brook trout and the threat of hybridizing nonnative cutthroat trout sub-species. Removal of nonnative fish would further improve otherwise optimal CRCT habitat. Barriers to fish migration would prevent nonnative fish species from reinvading the treatment area.

Boreal Toad

There are no known boreal toad populations within or near the proposed project area. However, the proposed project area contains suitable boreal toad habitat. As in all amphibians, boreal toad tadpoles utilize gills to breathe and are sensitive to rotenone. However, the proposed treatment of target waters would occur during the summer and fall; a time of year when most larval boreal toads would have metamorphed to terrestrial adult form and very few tadpoles would be present in waters to be treated. Therefore, because there are no known boreal toad populations within or near the proposed project

area and the application of rotenone would occur when very few tadpoles would be present in target waters, direct effects to adult boreal toads or their tadpoles from the application of rotenone would be very unlikely.

Potential direct effects to boreal toads would include trampling from treatment crews when walking stream banks during treatment activities. Because adult boreal toads are associated more with terrestrial habitats, direct application of rotenone or the neutralizing agent potassium permanganate to individual toads is very unlikely. In addition, because rotenone only impacts gill-breathing tadpole lifestages of amphibians, direct application of rotenone to an adult boreal toad would have very little if any effects.

Indirect effects to boreal toad would include a reduction in invertebrate prey food available to adult toads immediately following the temporary reduction in aquatic life stage aquatic macroinvertebrates. Terrestrial invertebrates would not be affected by the application of rotenone to target waters. Densities of aquatic macroinvertebrates are expected to recover within a few weeks following treatment, though it may take 1 – 2 years for taxa richness and diversity to recover to pretreatment levels. Activities associated with the proposed project may affect individuals but would not negatively affect habitat. Some waters not hydrologically connected to CRCT waters may be treated and left unstocked for the benefit of amphibians. Therefore, activities associated with this proposed project may impact individuals but is not likely to cause a trend toward federal listing or loss of viability and may improve habitat for amphibians by providing fishless waters. The effects of this proposed project on boreal toad habitat are expected to be insignificant and effects to individual boreal toads are extremely unlikely.

Columbia Spotted Frog

There are no known Columbia spotted frog populations within or near the proposed project area. However, the proposed project area may contain suitable Columbia spotted frog habitat. Columbia spotted frog tadpoles utilize gills to breathe and are sensitive to rotenone. The use of an unnecessarily high concentration of 1.0 mg/L CFT Legumine to remove nonnative fish may cause significant mortality to Columbia spotted frog tadpoles if they are exposed for long durations (96 h). Exposures to lower doses (0.5 mg/L of product) or for shorter durations (≤ 4 h), however, would result in less mortality (Billman et al. 2011). The proposed treatment of target waters would occur during the summer and fall; a time of year when most larval frogs would have metamorphed to terrestrial adult forms and very few tadpoles would be present in waters to be treated. Therefore, because there are no known Columbia spotted frog populations within or near the proposed project area and the application of rotenone would occur when very few tadpoles would be present in target waters, no direct effects to Columbia spotted frogs from the application of rotenone are expected and the proposed project would have no impact on Columbia spotted frog populations.

Indirect effects to Columbia spotted frog would include a reduction in invertebrate prey food available to adults immediately following the temporary reduction in aquatic life stage aquatic macroinvertebrates. Terrestrial invertebrates would not be affected by the application of rotenone to target waters. As discussed in the aquatic macroinvertebrate section below, densities of aquatic macroinvertebrates are expected to recover within a few weeks following treatment. Activities associated with the proposed project may affect individuals but would not affect habitat. Therefore, activities associated with this

proposed project may impact individuals but is not likely to cause a trend to federal listing or loss of viability. The effects of this proposed project on Columbia spotted frog habitat are expected to be insignificant and because Columbia spotted frogs are not known to occur within or near the proposed project area, effects to individual Columbia spotted frogs are extremely unlikely.

MIS

Cutthroat Trout

The streams and lakes proposed for treatment are inhabited by cutthroat trout including CRCT which is a Forest sensitive species. All fish species present in areas treated would be directly affected by the proposed rotenone treatment, which is intended to remove all fish. Only CRCT would be restocked following treatment, resulting in a beneficial long-term effect for CRCT. Therefore, negative impacts to cutthroat trout within the project area would be short-term. Furthermore, this alternative would make progress toward meeting goals and objectives identified in the Conservation Strategy for Colorado River cutthroat trout and the Forest Plan by enhancing habitat and status of CRCT. The Proposed Action would reduce the risk of CRCT being listed as a threatened or endangered species under the Endangered Species Act.

Under the Proposed Action, the threat to cutthroat trout from expanding and competing brook trout populations would be reduced on the ANF. In addition, nonnative cutthroat trout subspecies would be removed in the proposed treatment areas, reducing the threat of hybridization with CRCT.

Aquatic Macroinvertebrates

Aquatic macroinvertebrates are less sensitive to rotenone than fish. However, past monitoring and studies have determined several macroinvertebrate taxa experience direct mortality as a result of rotenone treatment and subsequent neutralization of rotenone using potassium permanganate. Several macroinvertebrate monitoring studies indicate macroinvertebrate densities recover to pretreatment levels in a matter of weeks and taxa richness and diversity recovers within one to two years post-treatment (Melaas et al. 2001).

Vinson et al. (2010) conducted a thorough review of published studies on the effects of piscicides on invertebrate assemblages. They suggest that the true impacts of piscicide treatments on invertebrate populations are not well known. Some studies reported few treatment effects on invertebrates and other studies reported substantial treatment impacts to invertebrates. The authors provide three factors they believe are the cause of the differences as: 1) piscicide concentration, duration, and treatment breadth; 2) aquatic invertebrate study objectives and sampling intensity; and 3) natural variation in toxicity among species and species groups. The magnitude of direct effects to aquatic macroinvertebrates is affected by the concentration and duration of piscicide application. Generally, the impacts of piscicides on macroinvertebrates are minimal and short-term when rotenone is applied at low concentrations and durations required to remove salmonids. High concentrations and long duration piscicide treatments may cause long-term damage to the aquatic ecosystem (Finlayson et al. 2010; Mangum and Madrigal 1999).

Vinson et al. (2010) also conclude there have been too few published studies with little comparability with respect to treatment methods and invertebrate sampling efforts to allow for any sweeping statements on the overall effects of piscicide use on aquatic invertebrates in general and stream invertebrates in particular. They also stress the need for scientists and managers to consider the effects on invertebrates and the consequences on a case-by-case basis.

Recent work by Finlayson et al. (2010) suggests that impacts to invertebrate assemblages can be reduced and mortality to target fish species maintained at lower rotenone concentrations than have generally been used in the past. The direct effects of toxicants to organisms are governed by the concentration and duration of exposure. High concentrations of rotenone (125-250 µg/L rotenone) and long treatment durations (up to 48 h) have resulted in severe impacts to invertebrate assemblages. Lower concentrations (25 – 75 µg/L) and shorter durations (<18 h) have resulted in less-severe impacts. Results from several studies suggest that rotenone treatment rates between 25 and 50 µg/L for 4 – 8 hours should eliminate trout in most circumstances and reduce impacts to aquatic invertebrate assemblages (Finlayson et al. 2010). The proposed treatment would use low concentrations (0.025 – 0.050 parts/million active rotenone) required to remove target trout species and short treatment durations of 4 – 8 hours as recommended by the label and the current Rotenone SOP Manual (Finlayson et al. 2010). Depending on the temperature of lakes to be treated, the effective treatment duration may be extended as a result of cold temperatures and may require the use of potassium permanganate to neutralize active rotenone in the lake.

Treating streams and lakes with rotenone could potentially directly affect undocumented endemic macroinvertebrate species. However, habitat types, water chemistry, and soil types of the proposed treatment area are very common among headwater basins and found throughout the Uinta Mountain range. Because of this, the likelihood of the presence of species endemic to microhabitats of waters proposed for treatment is extremely low.

Similar macroinvertebrate species composition among coldwater streams is attributed to the fact that macroinvertebrate species have good dispersal mechanisms which allow them to disperse over great distances to colonize streams elsewhere (Bilton et al 2001). In addition, several studies from a range of regions show taxonomic diversity is highly variable among headwater streams (Clarke et al. 2008). Following disturbance events, like rotenone treatments, floods or fires, rarity of macroinvertebrate taxa will be related to both organism dispersal rates and community succession during the colonization phase. Poor dispersers will have slower colonization rates and thus lower incidences of occupancy, making them more difficult to collect (Vinson and Vinson 2007). The impact to macroinvertebrate assemblages as a result of rotenone treatment at concentrations and durations required to remove trout is expected to be comparable to the level of impacts that would be experienced as a result of flood events (Vinson and Vinson 2007).

Under the Proposed Action, the aquatic macroinvertebrate assemblage would be directly affected in the short-term by the application of rotenone resulting in direct mortality to sensitive aquatic macroinvertebrate taxa. However, these effects would be short-term and macroinvertebrate density would recover quickly to pretreatment levels or higher following treatment. Furthermore, over the long-term, dispersal mechanisms employed

by the various macroinvertebrate taxa would contribute to the recovery of taxa richness and diversity to pretreatment levels.

Macroinvertebrate Recovery

The recovery of macroinvertebrate assemblages including density and diversity following rotenone treatment would be accomplished by several dispersal and recolonization mechanisms. These mechanisms include drift from untreated upstream waters, eggs deposited in the stream prior to treatment, movement from the hyporheic zone, and dispersal by winged adults to treated areas (Carvalho and Uieda 2006; Mangum and Madrigal 1999). Density of macroinvertebrates is drastically reduced after rotenone applications but soon becomes high again. However, diversity and dominance in the assemblage requires more time to recover. Employing the use of low concentrations over shorter durations minimizes the time needed for recovery. Recovery of macroinvertebrate density to pretreatment levels has been reported to be as short as a few days following treatments of low concentration and short duration. Recovery of macroinvertebrate diversity generally takes longer and has been reported to take one to two years for treatments of low concentrations and durations required to achieve removal of target species. Melaas et al. (2001) reported nearly all affected taxa recovered by the following spring following a fall rotenone application and a full recovery in a matter of months. All target waters would not be treated at the same time so colonization from adjacent bodies of water would be likely. In addition, headwater areas that do not support fish populations would not be treated. This would provide a refuge and accelerate macroinvertebrate repopulation of treated areas downstream. The current high quality stream and lake habitat would accelerate recovery of aquatic species.

Fishing Opportunities

Impacts to fishing opportunities within specific waters of the proposed project area would extend over an estimated 4 to 5-year period. CRCT would be restocked during the summer following the completion of last treatment. This would allow time for recovery of macroinvertebrate density to provide an adequate food supply. However, these fish would be stocked as fingerlings and would require two to three years to grow to a size desirable to most anglers. The long-term direct effects to the fishery would include a fishery containing only CRCT and no brook trout or nonnative cutthroat trout subspecies. Once the CRCT populations are established in the enhanced habitat, the fishery would likely consist of larger but fewer individuals than the current fishery containing both CRCT and nonnative species. In many cases, the current fishery is dominated by stunted brook trout.

Cumulative Effects

The cumulative effects analysis area for aquatic species is the Rock Creek, Lake Fork River and Yellowstone River drainages from the headwaters within the High Uintas Wilderness downstream through the project area to approximately one-half mile downstream of the neutralization site including the reach of Fish Creek outside wilderness. This area was selected as the cumulative effects analysis area because it encompasses the area on the south slope of the Uinta Mountains that would include effects to aquatic species from activities occurring upstream of the project area and at the broader ecosystem level.

Target areas would be treated at least twice to ensure complete removal of the existing fish population. Following the initial treatment, subsequent treatments could add cumulative effects to remaining effects of the first treatment.

Several grazing allotments for cattle and recreational stock are active within these three drainages. Livestock grazing has the potential to affect aquatic habitat including that of cutthroat trout and macroinvertebrate populations and diversity by removal of streamside vegetation and destabilizing banks, resulting in increased sediment delivery to aquatic habitats. Currently, grazing impacts on aquatic habitat within the proposed project area are minimal.

Recreational use of the Rock Creek, Lake Fork River and Yellowstone River drainages is relatively high. These drainages are very popular areas for users of the backcountry within the High Uintas Wilderness. Popular activities include accessing backcountry by horseback, backpacking, primitive camping and recreational fishing. The activities in the high recreational use areas have the potential to affect cutthroat trout and macroinvertebrate habitat. Recreational use including fishing at popular lakes has the potential to destabilize stream banks and lake shorelines through soil compaction, vegetation trampling and vegetation removal. Recreational impacts to aquatic habitat within the proposed project area are minimal.

High lake stabilization activities in the Garfield Basin of the proposed project area occurred during the summer of 2009. Lakes stabilized included Superior, Five Point, Drift and Bluebell lakes. The water levels of these lakes and stream flow were stabilized by breeching a portion of the dam, removing outlet structures and constructing an outlet channel. Stabilized lake levels and stream flows have improved habitat conditions for cutthroat trout and other aquatic species within the Garfield Basin.

Additional sedimentation is not expected as a result of activities associated with the Proposed Action. The Proposed Action would enhance habitat of CRCT within areas where competing nonnative fish were removed. The displacement of native cutthroat trout by competitive brook trout and hybridized cutthroat trout is considered the primary threat to the continued persistence of native CRCT populations throughout their range (CRCT Conservation Team 2006) including the High Uintas Wilderness.

Based on the rationale above, it is determined that the cumulative effects of past, present, and reasonably foreseeable future impacts from grazing and various recreational uses of the wilderness together with the direct and indirect effects of the Proposed Action would include potentially significant short-term effects to aquatic macroinvertebrate populations and habitat within the project area. However, it is determined that these cumulative effects combined with the proposed project would not adversely affect aquatic habitat in the long-term and would not contribute to a negative trend on the Ashley National Forest for aquatic macroinvertebrates or amphibians. In the longer term, the Proposed Action would be beneficial to cutthroat trout populations across the forest following restocking of treated areas with CRCT. This proposed project would improve conditions for cutthroat trout in the project area and because of the current high quality stream and lake habitat, negative cumulative effects are not expected. Therefore, the High Uintas Wilderness Colorado River cutthroat trout habitat enhancement project would not contribute to a negative trend on the Ashley National Forest for cutthroat trout or other aquatic species.

Terrestrial Biological Resources

This section describes the existing terrestrial biological resources associated with the selected treatment areas and assesses the potential impacts of the Proposed Action and No Action alternative on those resources. Terrestrial biological resources, for the purpose of this assessment, include mammals and birds.

This analysis of effects incorporates information presented in the Biological Assessment, Biological Evaluation and Wildlife Specialist Report. These documents include an assessment and evaluation of the potential effect of the Proposed Action on species warranted for protection under ESA, sensitive species, MIS and migratory birds that may occur within the selected treatment areas.

The USDI Fish and Wildlife Service Website provides a December 5, 2012 list of Threatened and Endangered species and Proposed and Candidate species for the Duchesne, Uintah, and Daggett Counties. There are six terrestrial species listed as occurring in these three counties. These species include the Canada lynx, Mexican spotted owl, black-footed ferret, western yellow-billed cuckoo, greater sage grouse and wolverine. Distribution and habitat of these species was reviewed. Only Canada lynx and wolverine are identified as having suitable habitat within or near the proposed project area.

USDI Fish and Wildlife Service designated terrestrial threatened, endangered, proposed or candidate species evaluated in the Biological Assessment (BA) included four birds and three mammals (table 7). Bird species include western yellow-billed cuckoo, Mexican spotted owl, greater sage grouse and mountain plover. The BA for this project was written prior to the USF&WS decision to remove the mountain plover from proposed listing. Therefore, the BA also considers mountain plover in the evaluation. Mammals include Canada lynx, black-footed ferret and wolverine. Canada lynx and wolverine are the only two species identified that may occur or have habitat within or near the project area.

USDA Forest Service Sensitive terrestrial species evaluated in the Biological Evaluation include peregrine falcon, spotted bat, Townsend's big-eared bat, bald eagle, boreal owl, great gray owl, flammulated owl, three-toed woodpecker, northern goshawk, common loon, trumpeter swan, mountain plover, pygmy rabbit and bighorn sheep. Of the fourteen species, six of them (bald eagle, boreal owl, great gray owl, three-toed woodpecker, northern goshawk and bighorn sheep) are likely to occur within the project area, in habitat near the project area or be affected by implementation of the Proposed Action.

There are seven terrestrial species of MIS that may be present in the project area. These are the Lincoln's sparrow, song sparrow, northern goshawk, golden eagle, white-tailed ptarmigan, Rocky Mountain elk, and mule deer.

Table 7. List of terrestrial wildlife species considered and analyzed for the proposed High Uintas Wilderness Colorado cutthroat trout habitat enhancement project

Species	Habitat within Project Area?	Potential Effects/ Analyzed Further
Threatened, Endangered and Candidate		
Western yellow-billed cuckoo *Coccycus americanus*	No	No
Mexican spotted owl *Strix occidentalis*	No	No
Greater sage grouse *Centrocercus urophasianus*	No	No
Canada lynx *Lynx canadensis*	Yes	Yes
Black-footed ferret *Mustela nigripes*	No	No
Wolverine *Gulo gulo*	Yes	Yes
Sensitive		
Spotted bat *Euderma maculatum*	No	No
Townsend's big-eared bat *Plecotus townsendii*	No	No
Bald eagle *Haliaeetus leucocephalus*	Yes	Yes
Boreal owl *Aegolius funerus*	Yes	Yes
Great gray owl *Strix nebulosa*	Yes	Yes
Flammulated owl *Otus flammeolus*	No	No
Three-toed woodpecker *Picoides tridactylus*	Yes	Yes
Northern goshawk *Accipiter gentilis*	Yes	Yes
Peregrine falcon *Falco peregrinus*	No	No
Trumpeter swan *Cygnus buccinator*	No	No
Common loon *Gavia immer*	No	No
Mountain plover *Charadrius montanus*	No	No
Pygmy rabbit *Brachylagus idahoensis*	No	No
Bighorn sheep *Ovis canadensis*	Yes	Yes
MIS		
Red-naped sapsucker *Sphyrapicus nuchalis*	No	No
Warbling vireo *Vireo gilvus*	No	No
Northern goshawk *Accipiter gentilis*	Yes	Yes
Golden eagle *Aquila chrysaetos*	Yes	Yes
Lincoln's sparrow *Melospiza lincolnii*	Yes	Yes
Song sparrow *Melospiza melodia*	Yes	Yes
Sage grouse *Centrocercus urophasianus*	No	No
White-tailed ptarmigan *Lagopus leucura*	Yes	Yes
Rocky Mountain elk *Cervus canadensis*	Yes	Yes
Mule deer *Odocoileus hemionus*	Yes	Yes

Affected Environment

The project area primarily occurs at the higher elevations in the Uintas. Coniferous forests near the project area include spruce/fir type, lodgepole pine and some mixed conifers. There are wet and dry meadows primarily composed of sedges, grasses, forbs, and low growing willows. There are lakes, ponds, and streams lined with willow. Some of the project area also occurs within high alpine areas consisting of alpine meadows (sedges, grasses, and forbs) above timberline with low growing willows.

Gill breathing organisms including fish, some forms of amphibians and aquatic invertebrates are sensitive to the effects of rotenone because rotenone is readily absorbed directly into their blood through their gills. All animals including fish, insects, birds and mammals have natural enzymes in the digestive tract that neutralize rotenone and the

gastrointestinal absorption of rotenone is insufficient. Because ingestion of rotenone is nontoxic to terrestrial wildlife species, consumption of aquatic organisms treated with rotenone will not affect birds and mammals (Finlayson et al. 2000). Effects to aquatic species including amphibians are analyzed and discussed in the Aquatic Biological Resources section of this DEIS.

Noise produced and/or human presence from performing activities required to complete the proposed project are identified as the primary actions producing effects to terrestrial wildlife. Noise produced and/or human presence associated with foot or horse travel to the project area as well as establishing and use of base camps (less than the allowable 14 people per camp site in wilderness) within the project area would not produce any more disturbance to the area than would normally occur with the current recreational use. Additionally, because of the short duration (one to two weeks) of the project in any given area at one time and the low numbers of pack stock (less than the allowable 15 for recreation use in the wilderness) that would be used for the project, grazing by pack stock used for the project is not likely to add any additional grazing than normally occurs with the current recreation use. Therefore, these aspects of the proposed project would not produce any additional impacts to wildlife. Therefore, there will be no other discussion in the document related to these aspects of the project.

Mechanized and/or motorized equipment discussed in this document refers to the equipment that may be used for rotenone application or detoxification. Neutralization of rotenone may require the use of generators to dispense potassium permanganate and the use of electric motors on boats to disperse rotenone on lakes.

Environmental Consequences

This section identifies and analyzes the potential direct and indirect effects on terrestrial biological resources resulting from the No Action and the Proposed Action alternatives. Impacts to biological resources are evaluated based on both potential temporary and permanent impacts.

Alternative 1: No Action

Under this alternative, the piscicide rotenone would not be used to remove competing and hybridizing nonnative trout. Therefore, there would be no additional or new impacts to terrestrial wildlife species and no further discussion under this alternative is warranted. All further discussion will be for the Proposed Action alternative.

Alternative 2: Proposed Action

Effects Common among Species

Finlayson et al. (2000) found that any wildlife which happens to consume water or dead fish treated with rotenone will not be adversely affected. All birds and mammals have enzymes in the digestive tract that neutralize rotenone. Also, rotenone residues in dead fish are generally very low (<0.1 ppm) and not readily absorbed through the gut of the animal eating fish. Birds and mammals that eat dead fish and drink treated water would not be affected. Finlayson et al. (2000) also found that a bird weighing ¼ pound would have to consume 100 quarts of treated water or more than 40 pounds of fish and invertebrates within a 24-hour period to receive a lethal dose of rotenone. This same bird would normally consume 0.2 ounces of water and 0.32 ounces of food daily. Also after

its release, rotenone rarely persists more than a few weeks in the environment. Therefore, there would be no effect to birds and mammals from consuming water treated with rotenone or dead fish containing rotenone. Rotenone would be applied directly to the water's surface. Therefore, the only likely route of exposure to rotenone for terrestrial wildlife would be through consuming water or dead fish treated with rotenone. Because birds and mammals are not adversely affected by consuming water or dead fish treated with rotenone, there will be no further discussion regarding toxicity in this document.

Mechanized and/or motorized equipment discussed in this document refers to the equipment that may be used for rotenone application or detoxification. Detoxification may require the use of generators to dispense the neutralizing agent (potassium permanganate) and the use of electric or gas powered outboard motors on boats.

Threatened, Endangered and Candidate Species

Canada Lynx

In the United States, lynx inhabit conifer and conifer-hardwood habitats that support their primary prey, snowshoe hares. Lynx habitat in the Southern Rockies is likely found within the subalpine and upper montane forest zones, typically between 2,450 – 3,650 meters (8,000 – 12,000 ft) in elevation. Habitat use of reintroduced lynx in Colorado consisted primarily of Engelmann spruce/sub-alpine fir (Shenk 2007, USDA Forest Service 2006b).

Snowshoe hares are the primary prey of lynx, comprising 35-97% of the diet throughout the range of the lynx. Southern populations of lynx may prey on a wider diversity of species than northern populations because of lower average hare densities and differences in small mammal communities. Other prey species include red squirrel, grouse, flying squirrel, ground squirrel, porcupine, beaver, mice, voles, shrews, fish, and ungulates as carrion or occasionally as prey. Foraging of reintroduced lynx in Colorado consisted primarily of snowshoe hare and red squirrel (varying percentages), but also of other small mammals and birds (Shenk 2007, USDA Forest Service 2006b).

There are 10 specimens of lynx that have been reliably traced to the Uinta Mountains, with collection dates ranging from 1916 to 1972. According to a completed biological assessment, lynx occur rarely, if at all in the Uintas. The Ashley National Forest began hair snare surveys in the fall of 1999 as part of the National Lynx Detection Protocol. In 1999, several hair samples were collected and results from the Rocky Mountain Research lab indicated no positive Canada lynx hair samples. Hair samples from the 2000 and 2001 field seasons also resulted in no positive Canada lynx hair samples (USDA Forest Service 2006b).

Between February of 1999 and March of 2007, twenty-two lynx (7 females: 15 males) from the experimental releasing in Colorado have been located at least once in Utah. Use-density of these locations indicates the primary area of use is in the Uinta Mountains, with the majority of use on the Wasatch-Cache NF and a somewhat lesser degree of use on the Ashley NF. Although potential for future residency of lynx in the Uinta Mountains is possible, these individual lynx were transient. Prior to these recent lynx occurrences, the last confirmed occurrence of lynx in the Uinta Mountains was in 1972. Additionally, Forest Service winter track surveys were initiated in the winter of 2010 and

continued through 2012. However, these track surveys did not document any lynx tracks in the Uintas (Christensen 2013, Shenk 2007, and USDA Forest Service 2006b, Christensen 2013).

A Lynx Analysis Unit, or LAU, is a subwatershed that approximates a female's home range. The project area is split up into small areas, which consists of the lakes and streams to be treated and the area immediately around these water bodies. These areas occur within several drainages in LAUs 7-10 (table 8).

Table 8. Acres of lynx habitat per LAU

LAU #	LAU Name	Total LAU Acres	Suitable Lynx Habitat Acres
7	Rock Creek	51,676	34,792
8	Lake Fork	46,615	23,885
9	Moon Lake	42,731	33,446
10	Yellowstone River	62,930	32,240

A Conservation Agreement and Strategy has been developed based on a Conservation Assessment that was completed in 2000 (Ruediger et al. 2000). In 2007, the Final Environmental Impact Statement for the Northern Rockies Lynx Management Direction (NRLMD) was released. Although the Ashley National Forest was considered in this new Management Direction to contain unoccupied habitat, this report contains the best available science and will be used in analyzing effects from projects to Canada lynx and Canada lynx habitat. However, the Lynx Conservation Assessment and Strategy (LCAS) will be considered in the analysis as well (Ruediger et al. 2000 and USDA Forest Service 2007, 2007a & 2007c).

There are very few standards and guidelines from the NRLMD and the LCAS that apply to this project since the project does not propose any manipulation of vegetation, or change in recreation uses, and would only occur during the summer. The primary disturbance to lynx and lynx habitat from the proposed project would be associated with noise from project activities. Objectives, Standards, and Guidelines from the NRLMD that apply to this proposed project are listed below (USDA Forest Service 2007, 2007a & 2007c). Standards and guidelines in the LCAS that pertain to this project are consistent with those in the NRLMD (Ruediger et al. 2000 and USDA Forest Service 2007, 2007a & 2007c).

Objective HU O5: Manage human activities such special uses, mineral and oil and gas exploration and development, and placement of utility corridors to reduce impacts on lynx and lynx habitat.

Direct and Indirect Effects

There is no vegetation manipulation proposed with this project, therefore there would be no direct effects to lynx habitat. All project activities would occur during the summer and would therefore avoid any disturbance to lynx or lynx habitat during the more critical winter period. Implementation of the proposed project would not increase recreational use in the LAUs. In the short term, it is possible that visitor use in these areas of the

LAUs could slightly decrease, but then visitor use would again attain current levels in the long term as a result of the removal of fish and the subsequent restocking. This is not expected to have much effect to lynx or lynx habitat within the LAUs, because no net gain in recreational use of these areas within the LAUs is expected as a result of the proposed project.

Noise produced and/or human presence associated with foot or horse travel to the project area as well as establishment and use of base camps (less than the allowable 14 people per camp site in wilderness) within the project area would not produce any more disturbance to the area than would normally occur with the current recreational use. Additionally, because of the short duration (one to two weeks) of the project in any given area at one time and the low numbers of pack stock (less than the allowable 15 for recreation use in the wilderness) that would be used for the project, grazing by pack stock used for the project is not likely to add any additional grazing than normally occurs with the current recreation use. Therefore, these aspects of the proposed project would not produce any additional impacts to lynx or lynx habitat within the LAUs than already exists.

The primary disturbance within the LAUs from the proposed project would come from noise disturbances associated with project activities at the water bodies to be treated. Mechanized and/or motorized equipment may be used for rotenone application or neutralization. Neutralization of rotenone may require the use of generators to mix the potassium permanganate and the use of electric or gas powered outboard motors on boats to disperse rotenone. This would constitute a new disturbance within lynx habitat in the LAUs. However, the noise would only disturb a small portion of lynx habitat at any given time, would be a temporary short duration (one to two weeks), and would not preclude the area from lynx use in the long term. Additionally, the likelihood of individual lynx being exposed to noise disturbance produced from implementation of the project is very low given that there are likely very few, if any lynx, on the Ashley NF other than the occasional wandering transplant from Colorado. Also, because habitat potentially affected by temporary noise from the project is small (far less than 1% of habitat within any of the LAUs at any given time) in comparison to available habitat within the LAUs, it is unlikely that lynx movement or foraging would be impeded.

If a lynx does happen to wander onto the Forest, and then into the project area, and consumes water or dead fish treated with rotenone, it would not be adversely affected. All birds and mammals have enzymes in the digestive tract that neutralize rotenone. Also, rotenone residues in dead fish are generally very low (<0.1 ppm) and not readily absorbed through the gut of the animal eating fish. A bird weighing ¼ pound would have to consume 100 quarts of treated water or more than 40 pounds of fish and invertebrates within a 24 hour period to receive a lethal dose of rotenone. This same bird would normally consume 0.2 ounces of water and 0.32 ounces of food daily. Also after its release, rotenone rarely persists more than a few weeks in the environment. Therefore, there would be no effect to lynx from consuming water treated with rotenone or dead fish containing rotenone (Finlayson et al. 2000).

Based on the above analysis, the proposed project would not change any suitable lynx habitat within LAUs 7-10 to an unsuitable condition, would not alter any linkage corridors, and would meet the objectives, standards, and guidelines outlined in the

NRLMD. Therefore, it is determined that the proposed project may affect, but would not likely adversely affect, lynx or their prey species.

Wolverine

Wolverine habitat consists of tundra, boreal forests, and the coniferous forests of western mountains of Alaska, Canada, and a portion of the contiguous United States. The southern portion of the species' range extends into the high elevations of Washington, Idaho, Montana, Wyoming, California, and Colorado. Wolverine are opportunistic feeders and they need a diversity of habitats to support their prey base, especially large mammals (scavenged ungulate carrion is an important food source), but they will also prey on small mammals and birds, insects, fruits, and berries. Habitat may be better defined as large, sparsely inhabited areas with adequate food, and winter precipitation that maintains deep persistent snow late into the warm season, rather than by topography or vegetation. Female wolverine use natal dens that are excavated in snow. Persistent, stable snow greater than 1.5 meters (5 ft.) deep appears to be a requirement for natal denning. They appear to be sensitive to habitat fragmentation and human disturbance. Consequently, they are often restricted to high elevation and remote portions of mountain ranges. The High Uintas Wilderness area of the Uinta Mountains contains suitable habitat (USDA Forest Service 2006b, USDI FWS 2010).

The lack of records or confirmed sightings of wolverine in Utah since 1921 has indicated that this species was extirpated from the state (USDA Forest Service 2006b, USDI FWS 2010). However, the US Fish & Wildlife Service considers Utah to be within the current range of wolverine (USDI FWS 2010). Additionally, recent studies summarized in a report released in 2004 to the Utah Division of Wildlife Resources, US Forest Service, and US Fish & Wildlife Service documented a single set of wolverine tracks in 2003 and 2004 on the North Slope of the Uintas (Wasatch-Cache NF) to be either wolverine or fisher tracks (USDA Forest Service 2006b). The location of these tracks is on the north side of the crest of the Uintas, and is not located on the Ashley NF. The report states that the tracks have not been confirmed as wolverine (USDA Forest Service 2006b). Photographic bait stations were placed on the Vernal District in 2005 and in the Yellowstone River drainage of the Roosevelt/Duchesne District in 2006. The photographic bait stations were an effort to sample the Uintas for the presence of wolverine. To date, there have been no detections of wolverines at these bait stations (Christensen 2013). Additionally, Forest Service winter track surveys conducted from 2010 through 2013 did not document any wolverine tracks in the Uintas (Christensen 2013).

Direct and Indirect Effects

For the same reasons described in the section for Canada lynx, rotenone would not affect wolverine. Noise produced and/or human presence associated with foot or horse travel to the project area as well as establishment and use of base camps within the project area would not produce any more disturbance to the area than would normally occur with the current recreational use. Likewise, grazing from pack stock used for the project is not expected to be any more than would normally occur with current recreation use. Therefore, wolverine would not be affected by these aspects of this project. Refer to more details of this rationale in the Canada lynx section.

There would be no habitat removal associated with the project, but mechanized equipment may be used, which could produce an additional disturbance in the area. If by chance wolverines do occur in the Uintas, they may exhibit an avoidance of the particular area being treated during that season. However, the noise from mechanized equipment would be isolated to a small area of available habitat for wolverine and would also last a short duration (one to two weeks). Additionally, if wolverines do occur in the Uintas, it is evident that they are rare, and the likelihood of one occurring near the project area at that particular time would be even more rare. Because the proposed project would not remove any habitat, mechanized disturbance being short in duration (one to two weeks in any given area), wolverine occurrence in the Uintas being rare, and the non-toxicity of rotenone to birds and mammals, it is determined that the project may affect, but would not likely adversely affect, wolverine or their prey species.

Forest Sensitive Species

USDA Forest Service Sensitive terrestrial species evaluated in the Biological Evaluation include peregrine falcon, spotted bat, Townsend's big-eared bat, bald eagle, boreal owl, great gray owl, flammulated owl, three-toed woodpecker, northern goshawk, common loon, trumpeter swan, pygmy rabbit and bighorn sheep. Of the thirteen species, six of them (bald eagle, boreal owl, great gray owl, three-toed woodpecker, northern goshawk and bighorn sheep) are likely to occur within the project area, in habitat near the project area or be affected by implementation of the Proposed Action.

Bald Eagle

Breeding habitat most commonly includes areas close to (within 4km of) coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources (e.g. fish, waterfowl, and seabirds). This eagle usually nests in tall trees or on cliffs near water. Nest trees include pines, spruce, firs, cottonwoods, oaks, poplars, and beech. Clutch size is 1-3 (usually 2), with incubation time of approximately 5 weeks. The young first fly at 10-12.5 weeks, but are still cared for by adults and may remain around nest for several weeks after fledging (USDA Forest Service 2006b).

Bald eagles feed opportunistically on fishes, injured waterfowl and seabirds, various mammals, and carrion. Wintering areas are commonly associated with open water, though in some areas eagles use habitats with little or no open water if other food resources (e.g. rabbit or deer carrion) are readily available. Winter habitat must also contain an abundant available food supply, with one or more night roost sites (USDA Forest Service 2006b).

Bald eagles are known to occur on the Ashley National Forest, primarily near Flaming Gorge Reservoir and the Green River corridor during the winter months. There have been occasional sightings in other areas of the Forest near waters until freeze-up. Bald eagles are considered to be a winter visitant to the state of Utah and are rare in the summer. However, one bald eagle nest was found near Flaming Gorge Reservoir (near the Forest's National Recreation Area) in April of 2004. A second nest was documented at Flaming Gorge in 2012. Bald eagles are occasionally seen in the Uintah Basin or on the Forest in the fall and during the winter. However, the only winter habitat on the Forest occurs on the Flaming Gorge District, near Flaming Gorge Reservoir. Winter habitat on the remainder of the Forest, including the project area, is absent due to heavy

snow cover and low availability of food (lack of expansive open water and very little carrion) during this time of year (Christensen 2013 and USDA Forest Service 2006b).

There have been no bald eagles documented or sighted within or near the water bodies to be treated. However, there have been a few bald eagles reported in adjacent drainages in recent years. Two bald eagles were sighted at Island Lake of the Brown Duck Basin the fall of 2007. Upon investigation it was determined the bald eagles were most likely migrating through to a wintering area. The area was surveyed again in June of 2008 and there was no sign of bald eagles using the area. In September of 2008 a bald eagle was reported flying above Kidney Lake in the Brown Duck Basin. The time of year again confirms that this is likely a migrating eagle. Site visits and glassing was also done in July and August of 2010, but no bald eagles were detected. A bald eagle was reported in the Grandaddy Basin area in August of 2010 and again in August of 2011, but again no bald eagles were detected (Christensen 2013 and USDA Forest Service 2006b).

The bald eagle, though no longer federally listed under the Endangered Species Act is still federally protected by the Bald and Golden Eagle Protection Act as well as the Migratory Bird Treaty Act. The National Bald Eagle Management Guidelines were developed in 2007, and provide guidelines to minimize impacts to the bald eagle from land management decisions. The guidelines recommend project activities occur at least 660 feet from a bald eagle nest when there is a line of sight visibility of the nest (USDI FWS 2007).

Direct and Indirect Effects

Habitat near the water bodies to be treated is not considered bald eagle nesting habitat or wintering habitat. Therefore the project would not affect nesting or wintering bald eagles. The recent bald eagle sightings in adjacent drainages were most likely eagles that were migrating or passing through the area and there is no evidence to suggest that bald eagles are nesting in the area. Immediately following the treatment and prior to restocking, there would be a reduction in the amount of fish available to eagles. However, lakes lower in the drainage and in adjacent drainages would still contain fish for the occasional foraging bald eagle.

Noise produced from the motorized equipment may cause bald eagles to avoid the area if an individual happens to pass through the area. However, the noise impacts would be isolated to a small area of available foraging habitat for the bald eagle and would also last a short duration (one to two weeks). Because there is no nesting or wintering habitat within or near the project area, bald eagles are not anticipated to be using the area. In addition, fish are available close to waters proposed for treatment and CRCT would be reintroduced to treated water bodies within one to two years following treatment. It is anticipated that the rotenone treatments of the selected water bodies would have little to no effect to bald eagles and would comply with the 2007 bald eagle management guidelines. Therefore, it is determined that the proposed project may impact individual bald eagles, but would not cause a trend toward the federal listing or cause a loss of viability to the population of this species.

Boreal Owl

The boreal owl occurs throughout the holarctic in boreal climatic zones. Within North America, boreal owls occur in a continuous band concurrent with the boreal forests of

Alaska and Canada. South of this continuous band, populations are restricted to subalpine forests with the southern most records in the mountains of northwestern New Mexico. In the southern portions of their range in North America, they are documented in subalpine forests characterized largely by subalpine fir and Engelmann spruce (USDA Forest Service 2006b).

Boreal owls nest in cavities excavated by woodpeckers in mixed coniferous, aspen, Douglas-fir, and spruce-fir habitat types. Nests are usually initiated by mid-April to the first of June, and young have usually fledged (28 – 36 day nestling period) by early July. Foraging habitat has been documented in mature and older spruce/fir forests. Prey consists of voles (particularly red-backed vole), lemmings, mice, shrews, pocket gophers, squirrels, chipmunks, small birds, and insects (USDA Forest Service 2006b).

Spring calling surveys on the Forest have detected five boreal owls (USDA Forest Service 2006b). Owl surveys in 2000, in the Lake Fork drainage, detected one boreal owl below Moon Lake (USDA Forest Service 2006b). In 2010, another boreal owl was detected by HawkWatch in the Dry Gulch area of the lower Yellowstone River drainage (Christensen 2013). Other owl surveys were done by Forest Service personnel in 2010 and 2011, including the Rock Creek, Lake Fork, and Yellowstone River drainages but no boreal owls were detected (Christensen 2013).

Direct and Indirect Effects

There would be no habitat removal from activities associated with the project. The project would likely occur after the fledgling period and therefore would be unlikely to affect any nesting owls. Additionally, nesting and foraging boreal owls have been documented to be tolerant of human and mechanical activities and their response to such activities seem indifferent (Hayward 1994). Therefore, nesting and foraging boreal owls are not likely to be displaced as a result of increased noise in the area from project activities (including motorized equipment). Because the proposed project would not remove any habitat, the project activities likely being conducted after the fledgling period, this species being tolerant of human and mechanical disturbances and mechanized disturbance being short in duration (one to two weeks in any given area), and the non-toxicity of rotenone to birds, it is determined that the project may impact individual boreal owls, but would not cause a trend toward their federal listing or cause a loss of viability to the population of this species.

Great Gray Owl

The great gray owl ranges from the boreal forests of Alaska, northwestern Wyoming, western Montana, Idaho, and through the Sierra Nevadas of California. In the southern portion of their range, great gray owls nest in relatively dry coniferous or mixed deciduous/coniferous forests, especially Douglas-fir, lodgepole pine, and aspen. Detections on the Ashley National Forest show they will also use mixed conifer forests. Eggs are usually laid by the first of May, and young have usually fledged in 3 –4 weeks (first of June) and ready to fly one to two weeks later (mid-June). Foraging habitat consists of relatively open grassy areas, or timber stands with low canopy closure and grassy understories. Availability of prey and nest sites (typically old hawk or raven stick nests or natural depressions in broken-topped snags) is believed to be the primary factors limiting distribution of this species (USDA Forest Service 2006b).

This species has been described as "casual or possibly a rare resident" of northeastern Utah. A statewide bird distribution study was less optimistic, listing the great gray owl as an "accidental" species (meaning it was considered outside its normal range) in extreme northern and northeastern Utah (USDA Forest Service 2006b). However, three great gray owls have been detected during calling surveys in the Uinta Mountains. In 1996 owl surveys detected two great gray owls near Chepeta Lake (Vernal District; USDA Forest Service 2006b). Another great gray owl was detected near Pole Creek Lake (Roosevelt District), which is approximately 25 miles east of the project area. Owl surveys were conducted on the District in 2010 and 2011, including the Rock Creek, Lake Fork, and Yellowstone River drainages, but there were no detection of great gray owls (Christensen 2013). There have been no great gray owls detected within or near the project area, however habitat for the great gray owl is present (USDA Forest Service 2006b).

Direct and Indirect Effects

The project area occurs at the southern most extent of this species' range, and because this species is considered a rare resident of the Uintas, the potential for this species to actually occur near the project area is low. If by chance any great gray owls are using habitat near the project area, noise disturbances from motorized equipment may have some effect to the individuals. However, the project activities would occur after the nesting season for this species so it is thus unlikely to be affected during this period. Because the occurrence of this species near the project areas would be rare, the proposed project not removing any habitat, project activities being conducted after the nesting/fledgling period, noise levels from motorized equipment being of short duration (one to two weeks), and the non-toxicity of rotenone to birds, it is determined that the project may impact individual great gray owls, but would not cause a trend toward their federal listing or cause a loss of viability to the population of this species.

Three-toed Woodpecker

The three-toed woodpecker ranges from Alaska across northern Canada to Newfoundland, and south and southeast through the Rocky Mountains to Arizona and New Mexico (DeGraaf et al. 1991). In Utah, this woodpecker nests and winters in coniferous forests, generally above 8,000 ft. in elevation (Parrish et al. 2002). They stay on their territories year-round, though insect outbreaks, such as spruce bark beetle infestations, may cause irregular movements (Parrish et al. 2002). Nesting for three-toed woodpeckers occurs in May and June and young can be found in the nest into July (Nature Serve 2003). In Montana, they have been known to fledge later, in early August (Nature Serve 2003). Because the three-toed woodpecker requires snags for feeding, perching, nesting, and roosting, it is threatened by activities such as logging and fire suppression, which remove or eliminate snags (Parrish et al. 2002). Feeding consists mainly of wood boring insects (Parrish et al. 2002).

This woodpecker has been found in lodgepole, Douglas-fir, spruce/fir and mixed conifer on the Ashley National Forest (USDA Forest Service 2006b). Woodpecker surveys have been conducted annually and document three-toed woodpecker occurrence across the Forest, including Rock Creek, Lake Fork and Yellowstone River drainages and headwater basins targeted by the proposed project (Christensen 2013 and USDA Forest Service 2006b). Habitat for this species occurs near the project area.

Direct and Indirect Effects

Since no vegetation would be removed, there would be no direct loss of three-toed woodpecker habitat from activities associated with the proposed project. Noise produced from the use of motorized equipment has the potential to temporarily displace some individuals into adjacent suitable habitat. However three-toed woodpeckers have been documented to be very tolerant of human activities, and human disturbance is not considered a threat to their populations (Leonard 2001). Therefore, nesting and foraging three-toed woodpeckers are not likely to be disturbed or displaced as a result of increased noise from project activities, including from motorized equipment. Also, the noise would only disturb a small portion of habitat at any given time and would only be for a short duration (one to two weeks). Therefore, because rotenone is not toxic to birds and mammals, and because noise related to the project is short in duration and is unlikely to disturb three-toed woodpeckers, it is determined that the proposed project may impact individual three-toed woodpeckers, but would not cause a trend toward the federal listing or cause a loss of viability to the population of this species.

Northern Goshawk

Also an Ashley National Forest MIS, the northern goshawk inhabits coniferous, deciduous, and mixed forests in North America and prefers to forage in closed canopy forests with moderate tree densities as compared to young forests (Graham et al. 1999). A goshawk's home range may be up to 6,000 acres and has three main habitat component needs (nesting, post-fledgling area, and foraging area) within this home range (Reynolds 1992). Nesting areas are typically 30 acres in size and may include more than one nest (Reynolds 1992). The post-fledgling area is 420 acres in size and surrounds the nest area (Reynolds 1992). The post-fledgling area typically includes a variety of forest types and conditions, but it should contain patches of dense trees as well as developed herbaceous areas and shrubby understory, snags, downed logs, and small openings (Reynolds 1992). These attributes are needed to provide the necessary habitats for hunting, security and prey species (Reynolds 1992). The foraging area is approximately 5,400 acres and surrounds the post-fledgling area (Reynolds 1992).

Guideline (r) of the Goshawk Amendment to the Ashley NF Forest Plan protects nest areas (30 acres) from Forest Service management activities and human uses for which the Forest issues permits, during the active nesting period (March 1st – September 30th). Guideline (v, ii) further restricts management activities during this period within the PFA (420 acres). There are no known goshawk territories within or near the project. However, there was a goshawk sighting in 2009 in the Yellowstone River/Garfield Creek drainage approximately 4 miles below Five Point Lake. Goshawk calling surveys were conducted in this area in 2009, 2010 and 2012, but no goshawks were detected (Christensen 2013). Goshawk surveys were also conducted in 2009 near the Swasey Hole area, but no goshawks were detected. However, goshawk habitat does occur near the project area.

The 2006 Forest-wide MIS Report stated that occupancy of goshawk territories on the Forest has fluctuated since the date that data collection began, but that statistical analysis of the Forest data showed the trend in the goshawk population across the Forest appeared to be stable (USDA Forest Service 2006). This report also stated that the Forest appeared to support a viable goshawk population and has continued to provide well distributed habitat across the Forest (USDA Forest Service 2006). A review of goshawk occupancy

and productivity on the Forest since 2006 determined that fluctuations appear to be consistent with the long term goshawk productivity on the Forest (Christensen 2013 and USDA Forest Service 2006). The 2006 MIS Report determined that based on statistical analysis it appears that the Forest supports a viable goshawk population and continues to provide well-distributed habitat across the Forest for this species. Despite goshawk productivity fluctuations since 2006 (typical of long term productivity on the Forest), a review of the data since 2006 appear to be consistent with the determinations in the 2006 MIS Report (Christensen 2013 and USDA Forest Service 2006).

Direct and Indirect Effects

Several of the water bodies to be treated are in the high alpine and have no goshawk habitat near those areas. Some goshawk habitat does exist, however, along the streams to be treated as well as the lakes at Swasey Hole, lakes in Fish Creek drainage, and a couple lakes in the Garfield and Oweep basins. Since no vegetation would be removed, there would be no direct loss of goshawk habitat from activities associated with the proposed project. Also, since no goshawk territories are known to occur near any of the water bodies that would be treated, nesting goshawks are not likely to be affected. Since noise related to crews traveling and/or staying at a base camp near the water bodies to be treated would not be any more than what normally occurs from recreationists, then any goshawks that may happen to forage in the area are not likely to be disturbed by human presence or noise related to those activities. Noise disturbance from the use of motorized equipment may temporarily displace some individuals that happen to be foraging in the area. However, the noise would only disturb a small portion of habitat at any given time, would be short duration (one to two weeks), and would not preclude the area from foraging in the long term.

Therefore, because rotenone is not toxic to birds and mammals, no goshawk territories near the treatment areas, no goshawk detections during surveys within or near the project areas, noise related to the project is short in duration and is unlikely to disturb goshawks, it is determined that the proposed project would be consistent with the Goshawk Amendment to the Forest Plan. It is also determined that the proposed project may impact individual goshawks, but would not affect the trend of the goshawk population on the Forest or impair the ability of the Forest to provide well-distributed habitat for this species.

Bighorn Sheep

There are three subspecies of bighorn sheep (*Ovis canadensis*) that occur or may occur within Region 4 Forest Service administered lands. These are the Rocky Mountain sheep (*Ovis canadensis canadensis*), California sheep (*Ovis canadensis californiana*), and Desert sheep (*Ovis canadensis nelsoni*) (Shackleton 1985, UDWR 2008a). Recent studies indicate that there is no genetic or taxonomic distinction between Rocky Mountain and California bighorn sheep (UDWR 2008a). Generally only the Rocky Mountain and California bighorn sheep are associated with National Forest System lands in the State of Utah (UDWR 2008a). Only one subspecies (Rocky Mountain sheep) occurs on the Ashley National Forest, and analysis in this document will focus on this subspecies (UDWR 2008a). Any further reference in this document to bighorn sheep will be referring to Rocky Mountain bighorn sheep, unless otherwise stated.

Bighorn sheep prefer open habitat types (high alpine to lower grasslands) with adjacent steep rocky areas for escape and safety (Shackleton 1985, UDWR 2008a). Habitat is characterized by rugged terrain including canyons, gulches, talus cliffs, steep slopes, mountaintops, and river benches (UDWR 2008a). Sheep habitat in North America is highly varied but is characterized by an open landscape and stable plant communities in which grasses predominate (UDWR 2008a). The diet of mountain sheep is primarily grasses and forbs, although they may utilize shrubs depending on season and availability (Shackleton 1985, UDWR 2008a). Rocky Mountain sheep generally migrate between summer and winter ranges, and their diet may vary within those ranges (UDWR 2008a).

The breeding season for bighorn sheep occurs from mid October to early December. During that time, rams engage in head butting clashes to establish dominance. The peak of the rut usually occurs in November. Gestation is about 180 days. Lambs, which are usually singles, are born in mid April to early June (Shackleton 1985 and UDWR 2008a).

Threats to bighorn sheep include disease, specifically disease transmission from contacting domestic sheep. Respiratory diseases such as Pasteurellosis have resulted in large-scale population declines in short periods of time (UDWR 2008a). Other threats to bighorn sheep include predation, possible forage competition (domestic and wild ungulates), and habitat loss from human disturbances (UDWR 2008a). Although bighorn sheep are a hunted species in Utah, hunting is not considered a threat to their population since the State monitors the populations and cautiously issues hunting permits.

The Utah Division of Wildlife Resources (UDWR) began transplanting Rocky Mountain bighorn sheep to lands administered by the Ashley NF as early as 1983. There are five bighorn sheep herds that occur, have occurred, or at least partially occur, on the Ashley NF. The North Slope Hoop Lake herd primarily occurs on the Uinta Wasatch-Cache NF, but a small number of bighorns occasionally migrate to the Ashley NF during part of the summer (UDWR 2009). The Sheep Creek Herd occurs near Flaming Gorge, but a few rams have been documented to mingle with some of the Hoop Lake herd sheep that occasionally cross onto the South Slope (Christensen 2013). Some of the locations of these sheep that crossed onto the South Slope have been on ridges above some of the water bodies to be treated (Christensen 2013). The other three bighorn sheep herds do not occur anywhere near the project area.

Direct and Indirect Effects

Since no vegetation would be removed, there would be no direct loss of bighorn sheep habitat from activities associated with the proposed project. The project would not occur during the breeding or lambing season.

Noise disturbance from the use of motorized equipment has the potential to disturb bighorn sheep that may happen to be using the ridges above the water bodies to be treated. Response of bighorn sheep to the use of the mechanized equipment for the project may be comparable to the response of bighorn sheep to motorized roads and trails. Gaines et al. 2003 found that bighorn sheep displaced at 350 meters from use of low traffic roads or motorized trails and at 500 meters from higher traffic roads. Papouchis et al. 2001 found that desert bighorn sheep fled larger distances from hikers than vehicles but that some groups of sheep had become habituated to high recreation use (including higher traffic volumes). MacArthur et al. 1982 found that heart rates of bighorn sheep increased in only 19 out of 215 sheep (8.8% of those sheep monitored) and

that only two of those 19 fled from vehicles. Given the results of these studies it is evident that a new mechanized disturbance in the area would likely disturb bighorn sheep that may happen to be using the area. However, water bodies to be treated are more than 500 meters from habitat that bighorn sheep may use in those drainages. Also, any noise that does occur would only disturb a small portion of habitat at any given time, would be short in duration (one to two weeks), and would not preclude the area from foraging in the long term. Additionally, since only a small number of bighorn sheep ever cross onto the South Slope, and since there are several ridges on the South Slope that these sheep could move across, the chances that bighorn sheep actually being in the area at the particular time the project would be occurring would be small.

Since rotenone is not toxic to mammals, no habitat removal occurring, the project not occurring during the lambing or breeding season, and the small likelihood of bighorn sheep actually being disturbed by noise produced from the project, it is determined that the proposed project may impact individual bighorn sheep, but would not cause a trend toward federal listing or cause a loss of viability to the population of this species.

MIS Species

There are seven terrestrial species of MIS that may be present in the project area. These are the Lincoln's sparrow, song sparrow, northern goshawk, golden eagle, white-tailed ptarmigan, Rocky Mountain elk, and mule deer.

Northern Goshawk

See *Northern Goshawk* section in *Forest Sensitive Species* section above.

Golden Eagle

The golden eagle is a management indicator for cliffs and rocks on the Forest (USDA Forest Service 2006). According to analysis done for the Forest Plan, the Forest provides 23,655 acres of golden eagle habitat that is in good condition (USDA Forest Service 2006). Though the cliffs/rock component is not present in the project area, other nesting habitat (large trees) and foraging habitat is present.

The golden eagle is a very large raptor and is found in a variety of habitats including open country, prairies, open coniferous country, barren and mountainous areas. In the western mountains golden eagles nest and roost in cliffs or large trees with large horizontal branches at 4,000 to 10,000 feet in elevation. In Utah they begin nesting in late February to early March and the incubation time is approximately 43-45 days. Young can fly at 60-77 days and the fledging period is therefore approximately mid July. They feed mainly in open country on small mammals (rabbits, marmots, and ground squirrels), insects, snakes, birds, juvenile ungulates, and carrion (USDA Forest Service 2006).

There are three known golden eagle nest locations on the Ashley NF, one of which was last active in 2002 and the other two were active in 2005. One of these nests occurs in a large ponderosa pine and the other two are on cliff ledges. Neither of these nests are located within or near the project area, but golden eagle habitat does occur near the project area and golden eagles have been documented at the higher elevations where the project areas reside (Christensen 2012, USDA Forest Service 2006).

The 2006 MIS Report determined that the golden eagle population on the Forest is stable and it is believed that the Forest provides well distributed habitat for this species (USDA Forest Service 2006). The locations and frequency of golden eagles documented on the Forest since the 2006 MIS Report was written, as well as a review of breeding bird surveys since that time, appear to be consistent with the determination in the 2006 MIS Report (Christensen 2013). Based on this information and the availability of the various habitats on the Forest that the golden eagle is associated with, it also appears that the Forest provides habitat for this species that is well distributed across the Forest (Christensen 2013).

Direct and Indirect Effects

The project would not remove any golden eagle habitat and would not affect any nesting golden eagles. Noise disturbances to foraging golden eagles could occur from the use of mechanized equipment. Studies have mixed results, with some studies showing golden eagles disturbed by nearby noise and other studies showing golden eagles are not disturbed (Kochert 2002). However, it is common knowledge that foraging golden eagles frequent roadsides to feed on carrion, and appear not to be too disturbed by human activities associated with roads, and therefore may not be disturbed by the project activities. Also, because of the short duration of the use of the mechanized equipment (one to two weeks) it is unlikely that there would be any lasting effects to this species from noise related disturbances produced by the project. Because the proposed project would have no effects to this species' habitat, project activities would not affect nesting eagles, rotenone being non-toxic to birds, and project noise disturbances in the area being short in duration (one to two weeks), it is determined that implementation of the project may impact individuals, but would not affect the trend of the golden eagle population on the Forest or impair the ability of the Forest to provide well-distributed habitat for this species.

Lincoln's Sparrow and Song Sparrow

Lincoln's sparrows and song sparrows are management indicator species for riparian shrubs on the Forest. Breeding habitat for the Lincoln's sparrow ranges from subalpine and montane zones found mainly in boggy, willow, sedge and moss-dominated habitats, particularly where shrub cover is dense to lower elevations where they prefer mesic willow shrubs, but can be found in mixed deciduous wood groves such as aspen and cottonwoods, mixed shrub willows, black spruce-tamarack bogs as well as a variety of other riparian habitat types. Lincoln's sparrows nest on the ground in areas of concealing vegetation and sometimes in low brush. Lincoln's sparrows are considered granivores and insectivores. They have a clutch size of 3-6 (usually 4-5) young, they can have up to two broods per year and young are tended by both parents. Young leave the nest at 10-12 days old (USDA Forest Service 2006).

Breeding habitat for the song sparrow consists of a wide range of forest, shrub, and riparian habitats. Other types of habitat used are grassland/herbaceous, old fields, shrubland, and woodlands such as conifers and hardwoods. Song sparrows nest on the ground, especially early in the season among clumps of dead grasses, weeds, and later in the season they nest 0.5-10m up in small conifer, thorny bushes, willows, cattails and cordgrass. Song sparrows are considered granivores and invertivores. Song sparrows have 3-6 young; 2-3 broods per year. Incubation usually lasts 12-13 days by the female.

The young are taken care of by both parents and they leave the nest at about 10 days old. Young are usually on their own at about 18-20 days, and are sexually mature in one year (USDA Forest Service 2006).

Surveys have found these sparrows in several areas where the project would occur (Christensen 2013). The 2006 MIS report determined that the song sparrow and Lincoln's sparrow population trends on the Forest are stable and that habitats for these species are well distributed across the Forest and is sufficient to sustain viable populations of these species (USDA Forest Service 2006). A review of the results of surveys for these species since 2006 determined that the population trend for these species is consistent with the determinations in the 2006 MIS Report (Christensen 2013).

Direct and Indirect Effects

The project would not remove any sparrow habitat. Noise disturbances to sparrows could occur from the use of mechanized equipment in the lakes that are near these sparrows' habitats. Song sparrows do not appear to be affected by human associated noise disturbances, but Lincoln's sparrows have been known to abandon nests (Arcese et al. 2002 and Ammon 1995). Therefore, Lincoln's sparrows may be more sensitive to noise disturbance than song sparrows. Most sparrows would have completed nesting and fledging in the project area before the time in which the project would be implemented. Because of this, disturbance to nesting sparrows is not likely to occur. If noise associated with the project causes nest abandonment, it is possible that re-nesting could be attempted. Additionally, the abandonment of a few nests in the area for each season of implementation is unlikely to have a long lasting effect on the long-term population trend. Also, because of the short duration of the use of the mechanized equipment (one to two weeks) it is unlikely that there would be any lasting effects to this species. Because the proposed project would have no direct effects to these species' habitats, rotenone being non-toxic to birds, and project noise disturbances in the area being short in duration (one to two weeks), it is determined that implementation of the project may impact individuals, but would not affect the trend of the Lincoln's sparrow or song sparrow populations on the Forest or impair the ability of the Forest to provide well-distributed habitat for these species.

Rocky Mountain Elk and Mule Deer

Elk in Utah and Wyoming are hunted, provide an important recreational activity on the Ashley National Forest, and bring in considerable economic activity to local communities. Elk are listed as an MIS for the Forest because of their economic importance as a hunted species (USDA Forest Service 2006).

Elk on the Ashley National Forest occupy most habitats from the highest elevations to the lowest. Typically they migrate to the lower elevations (winter habitat) on the periphery of the Forest or to adjacent lower elevation non-Forest Service lands in the winter months. The largest portions of winter habitat that occur on the Forest occur on the south unit of the Duchesne Ranger District and on the National Recreation Area in the Flaming Gorge Ranger District. With the exception of Wyoming big sagebrush, the mountain brush (mahogany, bitterbrush, serviceberry) and sagebrush communities (black sagebrush and Mountain big sagebrush) on the Forest appear to be in good condition with no long term losses. Except for some areas of the Forest with conifer invasion, aspen stands

appear to be in good condition and regeneration is occurring (USDA Forest Service 2006).

Elk require some element of escape and protection. Therefore, cover is an important component of elk habitat. Elk use dense cover for seclusion away from disturbance, and as thermal protection. They consume a combination of grasses, forbs, and shrubs. Winter foraging habitat, which has been documented as the limiting habitat factor for elk, consists primarily of browse and grass species such as aspen, sagebrush, mahogany, oak brush, serviceberry, snowberry, and bitterbrush (USDA Forest Service 2006). The rutting season occurs in September and October, with the peak of the rut occurring in mid to late September. Calves are usually born from mid May to early June (USDA Forest Service 2006).

The Utah Division of Wildlife Resources (UDWR) has set elk population objectives for each of the elk subunits in the state. The elk population objectives and current population estimates for the six wildlife management subunits which occur on the Ashley National Forest are presented in table 9.

Table 9. Elk population objectives and post-season 2011 estimates

Wildlife Management Subunits	Population Objective	Population Estimate
North Slope, Daggett	1,300	1,100
South Slope, Vernal	2,500	2,700
South Slope, Yellowstone	5,500	5,900
Nine Mile, Anthro	700	1,450
Wasatch Mountains, Avintaquin	1,500	1,900
North Slope Three Corners	500	550

The elk populations for these subunits have nearly met or exceeded the population objectives. The project area contains elk habitat and resides within the South Slope, Yellowstone subunit.

Based on the available data, the 2006 MIS Report determined that the elk population appeared to be stable, and that the population remained viable while sustaining an annual harvest (USDA Forest Service 2006). The 2006 MIS Report also determined that the Ashley National Forest provides elk habitat that is well distributed across the Forest and is sufficient to sustain viable populations of elk (USDA Forest Service 2006). A review of post hunting season estimates on elk populations since 2006 indicates the trend in the elk populations on the Forest appears to remain consistent with these determinations (Christensen 2013). The Forest continues to provide elk habitat that is well distributed and is sufficient to sustain viable populations (Christensen 2013).

Mule deer in Utah and Wyoming are hunted, provide an important recreational activity on the Ashley National Forest, and bring in considerable economic activity to local communities. Mule deer are listed as an MIS for the Forest because of their economic importance as a hunted species (USDA Forest Service 2006).

Mule deer occur in coniferous forests, desert shrubs, chaparral, grasslands with shrubs, and are often associated with early successional vegetation. In Utah, they occupy most ecosystems and are found in nearly all habitats in the state, although they are less abundant in desert areas. Mule deer habitat is nearly always characterized by areas of thick brush or trees (escape cover), interspersed with small openings (foraging areas). Mule deer on the Ashley National Forest occupy most habitats from the highest elevations to the lowest. Typically, they migrate to the lower elevations to access winter habitat on the periphery of the Forest or to adjacent low elevational non-Forest Service lands (USDA Forest Service 2006).

Mule deer eat a wide variety of plants including herbaceous plants (grasses and forbs) during the spring and summer, and current year's growth of leaves and stems of browse species during the fall and winter. Winter foraging habitat, which has been documented as the limiting habitat factor for mule deer, consists primarily of browse species such as sagebrush, mahogany, oak brush, serviceberry, and bitterbrush. The Forest provides a limited amount of this critical winter habitat, which is located at the lower elevations on the periphery of the Forest and on the South Unit. With the exception of Wyoming big sagebrush, the mountain brush (mahogany, bitterbrush, serviceberry) and sagebrush communities (black sagebrush and Mountain big sagebrush) on the Forest appear to be in good condition with no long term losses (USDA Forest Service 2006).

The breeding (rutting) season occurs in the fall with the peak of the rut occurring in mid November. In late spring the does seek solitude for fawning, and fawns are normally born during the month of June with an average fawning date in Utah of June 20 (USDA Forest Service 2006).

The Utah Division of Wildlife Resources has set mule deer population objectives for each of the mule deer subunits in the state. The mule deer population objectives and current population estimates for the five wildlife management subunits in which the Ashley National Forest occurs are outlined in table 10.

Table 10. Mule deer population objectives and estimates post-season 2011

Wildlife Management Subunits	Population Objective	Population Estimate
North Slope Unit	6,200	5,700
South Slope, Vernal/Diamond	13,000	11,500
South Slope, Yellowstone	13,000	7,000
Nine Mile Unit	8,500	4,500
Wasatch Mountains, Avintaquin	3,200	1,500

As indicated in the table above, the mule deer populations for these subunits are below the population objectives. The project area occurs near mule deer habitat and within the South Slope, Yellowstone subunit.

Based on the available data, the 2006 MIS Report determined that the mule deer population on the Forest appeared to be stable to slightly decreasing, but viable while sustaining an annual harvest (USDA Forest Service 2006). The 2006 MIS Report also

determined that the Ashley National Forest provides mule deer habitat that is well distributed across the Forest and is sufficient to sustain a viable population of mule deer (USDA Forest Service 2006). Post hunting season estimates on mule deer populations since 2006 indicates the trend in deer populations remain consistent with these determinations. It also appears that the Forest continues to provide mule deer habitat that is well distributed across the Forest and is sufficient to sustain populations.

Direct and Indirect Effects

There would be no habitat removal and the project would not occur during the winter, breeding, calving, or fawning seasons. Noise disturbances from project activities may displace elk and deer from the immediate area of project activities (mechanized equipment). However, the use of mechanized equipment would be for a short duration (one to two weeks) and it is anticipated that the disturbance would not be enough to push elk or deer out of the particular basin the work may occur in. Any avoidance behavior exhibited by elk and deer is not anticipated to affect habitat use patterns by these species in the long term, since the project would only occur for approximately one to two weeks during each season of implementation. Because the proposed project would have no direct effects to these species' habitats and likely cause only minimal avoidance of the project area, project activities not being conducted during the winter, calving, fawning, or breeding seasons, rotenone not being toxic to mammals, and project noise disturbances being short in duration, it is determined that implementation of the project may displace and impact individuals, but would not affect the trend of elk and mule deer populations on the Forest or impair the ability of the Forest to provide well-distributed habitat for these species.

White-tailed Ptarmigan

The white-tailed ptarmigan is an indicator species for alpine meadows on the Forest. They inhabit alpine tundra with sparse vegetation in high mountains. They breed at timberline adjacent to stunted spruce-willow alpine areas, otherwise known as krummholz. During the winter, ptarmigan inhabit areas associated with tall willows exposed above the snow along stream courses or areas associated with low-growing willow that are exposed above the snow in high windswept basins near timberline. Breeding occurs in early May in areas that consist of bare southerly exposures or windswept areas that are associated with willow. Nests are found on the ground in snow free areas, usually under a small shrub or next to rocks larger than 6 inches. In the Uinta Mountains, eggs are incubated for 23 days and usually hatch by mid to late July. Broods are usually found near succulent vegetation at the periphery of the highest alpine basins ranging in elevations from 11,200 to 13,000 feet. They feed on willow, forbs, leaves, flowers and some insects (USDA Forest Service 2006).

In 2009, surveys were conducted for ptarmigan at the head of the Yellowstone River and the Uinta Canyon drainages, and ptarmigan or evidence of their presence was observed in both areas. Surveys conducted in 2012 resulted in one ptarmigan observed in Garfield Basin, but no detections in Ottoson Basin. Ptarmigan have previously been reported near water bodies to be treated (Christensen 2013 and USDA Forest Service 2006).

The 2006 MIS report determined that it is believed that the white-tailed ptarmigan population on the Forest is viable, stable, is well distributed throughout its limited range on the Forest, and habitat is in a stable to upward trend (USDA Forest Service 2006). A

review of long term vegetation sites in white-tailed ptarmigan habitat indicates that vegetation within white-tailed ptarmigan habitat remains at a stable to upward trend, which is consistent with what was reported in the 2006 MIS Report. Additionally, a review of harvest data and surveys since 2006 indicates the white-tailed ptarmigan population in the Uintas is viable, wide spread, and able to withstand an annual harvest (Christensen 2013).

Direct and Indirect Effects

The majority of project activities would not occur within ptarmigan habitat and would not occur during the breeding season. Habitat removal would not occur, however noise disturbances could affect individuals. Project activities (use of mechanized equipment) around the lakes and streams in the high alpine areas could occur while ptarmigan are still on nests and during the brood rearing period. However, nesting habitat for ptarmigan occurs more on the ridges and therefore nesting birds are not likely to be affected by project activities.

Brooding may take place near some of the lakes and streams to be treated; however, the noise from the mechanized equipment would be of a short duration (one to two weeks) each season of implementation. If ptarmigan are displaced from habitat that occurs near the project area, given the amount of primary brooding habitat for ptarmigan and the unlikelihood that ptarmigan are beyond carrying capacity in these alpine basins, displacement would be into primary habitat that is unlikely occupied by other ptarmigan. Therefore, the project would not produce any long term effects to this species.

Because the proposed project would not remove any of this species' habitat, project activities being conducted after the ptarmigan breeding season, project activities not occurring in nesting habitat, project noise disturbances being short in duration, displacement being temporary and into adjacent unoccupied primary habitat, and rotenone being non-toxic to birds, it is determined that implementation of the project may impact individuals, but would not affect the trend of the white-tailed ptarmigan population on the Forest or impair the ability of the Forest to provide well-distributed habitat for this species.

US F&WS Birds of Conservation Concern and Utah Partners in Flight Priority Species (Migratory Birds)

The Memorandum of Understanding of December 8, 2008 between the USDA Forest Service and USDI Fish and Wildlife Service to promote the conservation of migratory birds provides direction for managing migratory birds. This direction includes evaluating the effects of agency actions on migratory birds, focusing on species of management concern along with their priority habitats and key risk factors. The MOU furthers directs to the extent practicable: evaluate and balance long-term benefits of projects against any short- or long-term adverse effects when analyzing, disclosing, and mitigating the effects of actions; pursue opportunities to restore or enhance migratory bird habitat in the project area; and consider approaches, to the extent practicable, for identifying and minimizing take that is incidental to otherwise lawful activities (USDA Forest Service 2008b).

The Utah Partners in Flight (PIF) working group completed a statewide avian conservation strategy in 2002 (Parrish et al. 2002). The strategy identifies "priority species" for conservation due to declining abundance or distribution, or vulnerability to

various local and/or range-wide risk factors. This list of priority bird species is intended to be used as a tool by federal and state agencies in prioritizing bird species that should be considered for conservation action (Parrish et al. 2002). One application of the strategy and priority list is to give these birds specific consideration when analyzing effects of proposed management actions, and to implement the recommended conservation measures where appropriate.

Several of the species on the Birds of Conservation Concern and Priority Species lists occur or have habitats within or near the project area. These species are the black rosy-finch, black swift, broad-tailed hummingbird, golden eagle, bald eagle, prairie falcon, and three-toed woodpecker (Nature Serve 2003, Parrish et al. 2002). Recent surveys have documented the black rosy-finch, broad-tailed hummingbird, and prairie falcon within the drainages to be treated (Christensen 2013). The bald eagle and three-toed woodpecker are sensitive species. The golden eagle is an MIS on the Forest.

Direct and Indirect Effects

There would be no habitat removal for any of these species. Species like the black rosy-finch that occur at or near the ridge tops and away from the water bodies to be treated would have little potential to be affected by noise or any other project activities. Species like the black swift, broad-tailed hummingbird, and prairie falcon may be affected by noise disturbances from project activities. However, since the majority of project activities would be conducted after the fledgling and nesting periods for these species, use of mechanized equipment would be of a short duration (one to two weeks each season of implementation), and rotenone being non-toxic to birds, it is determined that implementation of the project may displace and/or impact individuals, but would not adversely affect these species' populations as a whole.

Cumulative Effects

The cumulative impacts area for wildlife would be the part of Rock Creek, Lake Fork, and Yellowstone River drainages to the area approximately one half mile downstream of the neutralization station. This area was chosen as the cumulative effects area because it is large enough to capture effects to wildlife from activities that occur within the wilderness cumulatively with the proposed project. The term "wildlife" in the below analysis refers to sensitive, TES, MIS and migratory birds. Cumulative impacts to wildlife within the wilderness area include recreational based activities (camping, hiking, hunting, fishing, horseback riding, sight seeing and wildlife viewing) and grazing.

Grazing removes vegetation that wildlife species or their prey species utilize. However, grazing practices on the allotments that the project area occurs in take wildlife needs into consideration and ensure a residual amount of vegetation to be left for wildlife. Within the wilderness area, grazing is only allowed to take up to 40% use of forage, therefore leaving the majority for wildlife benefit. Furthermore, the amount of habitat actually being disturbed by noise associated with grazing in the proposed project is small in relation to wildlife habitat available in the cumulative effects area. Grazing by any stock used for the project is not anticipated to be any more than would normally occur with the current recreation use of the areas. Therefore, combining grazing with the proposed project would have no additive effects on wildlife.

Increased recreational use is not anticipated to result from implementation of the proposed project. Initially there may be a decrease in angler use after the project, until fish populations build back enough catchable fish to entice anglers to visit these areas. After catchable fish size is attained, then angler use is anticipated to be back at current levels. Therefore hiking, hunting, camping, fishing, wildlife viewing, sightseeing, and horseback riding would not add cumulative impacts to wildlife when combined with the proposed project.

Since these uses have little impact on wildlife in the Wilderness, and since project activities in the area would be short in duration (one to two weeks for each of two treatments, followed by a possible third treatment), the combined effect to wildlife from these uses and the project would be negligible.

Wilderness Values and Management

This section describes the wilderness values and management associated with the selected treatment areas and assesses the potential impacts of the Proposed Action and No Action alternatives on wilderness values and recreation. Proposed treatment areas are located within the 456,705-acre High Uintas Wilderness Area.

This analysis of effects incorporates information presented in the High Uintas Wilderness Area specialist report.

Affected Environment

The proposed project is located within three major drainages on the south slope of the Uinta Mountains within the High Uintas Wilderness (HUW). The High Uintas Wilderness was designated by congress in 1984 and covers 456,705 acres in northeast Utah and is administered jointly by the Ashley National Forest and the Uinta-Wasatch-Cache National Forest. The main crest of the Uinta Mountains runs east to west for more than 60 miles rising above the Wyoming Basin on the north and the Uintah Basin on the south. From the mountain range crest, secondary ridges extend north and south forming glacial basins which contain hundreds of lakes, streams and meadows. The Uinta Mountains rise from 7,500 at the lowest point to 13,528 feet at the summit of Kings Peak, offering diverse habitat for a wide variety of flora and fauna as well as numerous recreational opportunities. There is an extensive network of 545 miles of trail within the HUW which leads visitors to numerous meadows and lakes within its basins. The CRCT is native to the South Slope of the Uinta Mountains. The historic range of the sub-species includes eastern Utah, western Colorado, and southwest Wyoming. Restoring the native trout to its native range is consistent with the Wilderness Act.

Regulatory Setting

The Wilderness Act of 1964 established the terms and conditions for management of wilderness areas on National Forests. The Utah Wilderness Act of 1984 designated several wilderness areas including the High Uintas Wilderness. This Act adopts direction from the Wilderness Act but also contains additional special provisions for management of wilderness areas within Utah. Human activities such as recreational opportunities and grazing are allowed within the wilderness but all activities are managed to meet objectives for the High Uintas Wilderness. These objectives are 1) Natural conditions and wilderness character or "wildness", 2) Ecological health and integrity, 3) Education

on wilderness values, 4) Opportunities for solitude or primitive and unconfined recreation, and 5) Special provisions found in both acts, such as grazing and water use.

The USFS may authorize occupancy and use of National Forest land to carry out the purposes of the Wilderness Act. In general, it is desirable to not allow motorized use in designated wilderness areas. However, the USFS can prescribe conditions under which motorized equipment, mechanical transport, aircraft, aircraft landing strips, heliports, helispots, installations, or structures may be used, transported, or installed by the USFS and its agents and by other Federal, State, or county Agencies or their agents, to meet the minimum requirements for authorized activities to protect and administer the Wilderness Area (36 CFR 293.6c).

Environmental Consequences

This section identifies and analyzes the potential direct and indirect effects on wilderness values and recreation resulting from the No Action and the Proposed Action alternatives. Impacts to wilderness values and recreation are evaluated based on both potential temporary and permanent impacts. Issues addressed in this section include Issue #2: Effects of implementing the proposed action, including the use of motorized or mechanized equipment to disperse and neutralize rotenone, on wilderness character and recreation and Issue #4: Effect of the change in fishery management (brook trout replaced by cutthroat trout) on wilderness values and recreation use.

Alternative 1: No Action

Wilderness

The proposed use of mechanized or motorized equipment to dispense rotenone and neutralize with potassium permanganate would not occur as a result of the No Action alternative. Mechanized or motorized equipment would not be brought into the wilderness. Therefore, the limited amount of noise associated with using this equipment would not be present and would not affect wilderness character.

Under the No Action alternative there would be no immediate effects to the High Uintas Wilderness. All aspects of wilderness character and ecological components would remain unchanged. Opportunities such as hiking, horse packing, camping and recreational fishing would remain unchanged with no effect on opportunities for solitude or primitive and unconfined types of recreation. However, CRCT would not be restored to its native habitat and the fishery would continue to trend toward brook trout dominated populations with increased potential for stunted populations. This would negatively impact the naturalness of the wilderness and preclude wilderness visitors from the opportunity to see or catch fish native to streams and lakes in the area. Brook trout would continue to displace CRCT and Yellowstone cutthroat trout and their hybrids would continue to threaten the remaining genetically pure populations of CRCT through hybridization and competition for habitat. The effects of nonnative fish would continue to diminish naturalness and wilderness value.

Recreation

The proposed use of mechanized or motorized equipment to dispense rotenone and neutralize with potassium permanganate would not occur as a result of the No Action alternative. Mechanized or motorized equipment would not be brought into the

wilderness. Therefore, the limited amount of noise associated with using this equipment would not be present and would not affect recreation quality.

Under the No Action alternative, the existing fish species present in the Fall Creek, Ottoson Basin, Swasey Hole, Garfield Basin, Oweep Creek and Fish Creek area streams and lakes would remain unchanged. Fisheries of pure native fish species would be scarce so the opportunity for wilderness visitors to fish native streams would be very limited. The piscicide rotenone would not be introduced into the system, which would eliminate any chemical effect on the aquatic systems in these areas. The No Action alternative would not change the existing wilderness experience, hiking, horse packing, camping or hunting opportunities. This alternative would not contribute to any direct physical deterioration of the area or the High Uintas Wilderness. However, under the No Action alternative the opportunity for wilderness visitors to fish streams and lakes of native trout species would be scarce and would be expected to continue to decline. The No Action alternative would not increase the natural quality of wilderness.

Alternative 2: Proposed Action

Under the Proposed Action, piscicide treatment of selected lakes and streams within the Rock Creek, Lake Fork and Yellowstone River drainages would have both short term and long term effects on wilderness character. Assessments of these potential effects are presented below by wilderness attributes.

Untrammeled

Waters within the High Uintas Wilderness have been manipulated by humans over the years since the early 1900s. The water holding capacity of various lakes was increased by constructing dams to store water for irrigation purposes in the lower valley areas. This action was recently reversed during the High Lakes Stabilization Project which breached the dams on a number of these lakes lowering the water level to a natural state.

The Proposed Action would cause trammeling of the High Uintas Wilderness through human manipulation of the aquatic ecosystem. This would result in impacts on ecological processes as non-native trout are removed through piscicide treatment and CRCT are reintroduced into their native habitat. For each treatment area this impact would be short term during the time of treatment setup and treatment implementation, which would include the use of electric trolling motors to disperse rotenone on lakes and a gas powered generator operating an auger to neutralize rotenone treated water. There would also be a period of a couple days needed for clean up. This trammeling would be beneficial in the long term and would improve wilderness character by returning the fish population to a natural state by removing non-native and hybridized fish and replacing them with native CRCT. Once CRCT populations have become established it is expected that little or no stocking would be needed in treatment areas.

Undeveloped

The Proposed Action would adversely affect the undeveloped quality of wilderness in the short term during treatment activities of approximately one to two weeks each year of implementation. This would be caused by the proposed use of motorized and mechanized equipment to dispense rotenone and then neutralize it using potassium permanganate within the wilderness. Rotenone would be dispersed within the lakes

using rafts powered by small electric motors. Though smaller and notably quieter than gasoline motors they would be seen and potentially heard by visitors within the vicinity of the lake during the rotenone dispersal process. Neutralizing station augers would be powered by small generators. The smallest effective generator would be used but the stations could potentially be seen and the sound may potentially be heard by wilderness visitors traveling the trail system or camping within the area. Wilderness visitors may associate sounds and sights from dispersal rafts and neutralizing stations with civilization.

Signs would be installed at the trailhead to inform visitors of treatment activities. The Proposed Action would have no long term visual impacts and no permanent structures would be constructed during the project.

Natural

The Proposed Action would adversely affect the natural character of the High Uintas Wilderness in the short-term as a piscicide would be introduced into the aquatic ecosystem which would have impacts to aquatic organisms, macroinvertebrates and amphibians. The chemical presence would be short term as the piscicide rotenone has a short half life and neutralizing stations would be set up on streams. Rotenone is specific to gilled aquatic organisms but would adversely affect some macroinvertebrates. Impacts to amphibians would be reduced by treating later in the summer when water flows are lower and these species are out of tadpole stage.

In the long term, naturalness of the wilderness would be improved with a healthier, more naturally functioning ecosystem as a result of the Proposed Action. The treatment would restore fish native to the area while non native and hybridized species would be removed from the system.

Outstanding Opportunities for Solitude or a Primitive and Unconfined Type of Recreation

The Proposed Action would have a short term impact on visitor recreation and opportunities for solitude. During treatment there would be a period of only one to two weeks each year for two consecutive years (followed by a possible third treatment) within each treatment area in which removal efforts may impact visitors. The project would be implemented in the fall when wilderness visitation is at a lower level. Treating one basin at a time would still allow for numerous other areas within the wilderness where visitors could find solitude opportunities. During the treatment process, electric trolling motors would be used on rafts for effectively dispersing rotenone. A small gas powered generator would be used to power an auger to neutralize rotenone treated water. In addition, the immediate treatment area would be closed to the public and treated waters would be closed until a 24-hour bioassay demonstrates survival of sentinel fish indicating rotenone had sufficiently neutralized. Workers would be present throughout the area being treated and pack stock would be using the trail system with the potential to diminish the experience of solitude for wilderness visitors. Crews would abide by special orders pertaining to camping, fires and stock and would follow Leave No Trace practices and camp at campsites designated by the Forest Service in order to minimize impacts to the wilderness. The levels of use by crews implementing the Proposed Action would not be at levels greater than that allowed by the general public users of the wilderness. Crews would adhere to wilderness restrictions related to group size, number of stock, camp locations and other restrictions at all times within the High Uintas Wilderness. The

ability for visitors to find solitude following treatment would be similar to pre treatment levels.

Treatment would result in short-term localized impacts to angling opportunities as non-native fish species are removed from treated lakes and streams. Once CRCT are successfully reintroduced, opportunities for fishing for native trout in a wilderness setting would be available. Restoring CRCT to wilderness lakes and streams would provide individuals with an opportunity to catch trout native to the drainage.

Recreation

Implementation of this action would have direct short-term impacts on wilderness visitors and recreational fishing. Short-term impacts would occur during treatment activities for approximately one to two weeks in the summer or fall each year for at least two years. Impacts would be experienced in the form of closure of the immediate treatment area during treatment activities and treated waters would be closed to the public until a 24-hour bioassay demonstrating survival of bioassay fish. There would also be a small increase in the number of people in the area, rafts on the lakes with small electric motors, generator and auger operation at neutralization stations, crew camps, dead fish and cleanup. Dead fish may bring scavenger and/or predator wildlife species into the treated area resulting in potential increased incidence for interaction between these wildlife species and visitors. However, concentrations of dead fish near public use areas would be netted and disposed of by burying. Scenic value of lakes would be lowered as boats are used to distribute rotenone. This would only be for a short time of less than one day each year of treatment for each lake. Effects of up to five years from the initiation of treatment in an area would be felt by visitors participating in recreational fishing. This would be from elimination of all fishes and the time needed for waters to return to a fishable status. Following treatment, lakes would immediately be restocked with fingerling CRCT which would be expected to reach a fishable size within two years but it may be four to five years before fisheries become well established (Brunson 2011).

Solitude value of the wilderness would be compromised by motors on the boats, but due to the use of quieter electric motors the distance the noise travels from the site would be greatly reduced over gas powered motors. Wilderness solitude would also be compromised by motors used at neutralization stations, but this would be minimal as these stations would be placed further down the drainages and most recreational activities occur around the lakes. The greatest impact on wilderness solitude would be for hikers and horse packers using trails which parallel drainages. This would be for a short time as visitors move up or down the trail and out of range of the motor sounds.

Options for recreational fishing would remain in other areas of the headwater basins. Upper Rock Creek and Squaw Basin would be available in the Fall Creek area, East Basin and Brown Duck are within a short distance of Ottoson Basin and Oweep Creek. The most limited area would be within the Yellowstone River drainage where there are only a handful of lakes below and above Garfield Basin which would not be treated. South slope fishing opportunities would remain unchanged within the untreated drainages of West Fork of Rock Creek (Granddaddy Basin), Swift Creek and Uinta Canyon.

The diversion of recreational fishing activities in the lower use areas of Fall Creek, Ottoson Basin, Oweep Creek, Toquer Lake or Fish Creek to other basins would not significantly increase the use in other areas of the wilderness. Swasey Hole and Garfield

Basin are popular destination lakes for Boy Scout groups where 90 to 95 percent of groups participate in fishing activities. The diversion of recreational fishing activities from these two basins could result in increased use in Basins such as Brown Duck and Granddaddy due to their close proximity to the trailhead. This increased use would not result in use levels greater than that allowed and would still meet outstanding opportunities for solitude and primitive and unconfined type of recreation within these basins.

Fishing opportunities would be reestablished in treated areas approximately 1 – 2 years following restocking of streams and lakes with CRCT. Once populations reach adequate numbers of all age classes, these populations should sustain themselves. The type of recreational fishing opportunities would change from fishing for smaller nonnative brook trout to fishing for potentially fewer but generally larger native CRCT.

Cumulative Effects

The cumulative impacts area for wilderness values and management would be the part of Rock Creek, Lake Fork, and Yellowstone River drainages that occur from the headwaters downstream to the area approximately one half mile downstream of the neutralization station which included Fish Creek outside of wilderness. This area was chosen as the cumulative effects area because it is large enough to capture effects to wilderness values from activities that occur within the wilderness cumulatively with the proposed project.

Several grazing allotments for cattle and recreational stock are active within these three drainages. Recreational use of the Rock Creek, Lake Fork River and Yellowstone River drainages is relatively high. These drainages are very popular areas for users of the backcountry within the High Uintas Wilderness. Popular activities include accessing backcountry by horseback, backpacking, primitive camping and recreational fishing. The activities in the high recreational use areas have the potential to affect solitude and recreation quality in the wilderness. The proposed project area would be closed to public access during implementation activities. This includes the time period of the dispensing and neutralization of rotenone. There would be some users of the wilderness displaced by the short-term (one week to two week period) closure of the proposed project area. These users would likely access nearby or adjacent areas within the wilderness. The level of use of the area by crews and stock during implementation of project activities would not exceed that allowed to the public.

Based on the rationale above, it is determined that the cumulative effects of past, present, and reasonably foreseeable future impacts from grazing and various recreational uses of the wilderness together with the direct and indirect effects of the Proposed Action would include potentially significant short-term effects to wilderness values and recreation within the project area. However, it is determined that these cumulative effects combined with the proposed project would not adversely affect wilderness character or recreation in the long-term. In the longer term, the Proposed Action would be beneficial to wilderness character and recreation through enhanced naturalness to the area and improved recreational opportunities.

Soil and Water Resources

This section describes the existing water resources associated with the selected treatment areas and assesses the potential impacts of the Proposed Action and No Action alternatives on those resources.

This analysis of effects incorporates information presented in the Hydrology Specialist Report.

Regulatory Setting

Clean Water Act

Under Section 305(b) and 303(d) of the Clean Water Act as amended, each state is required to identify those water bodies that do not meet Water Quality Standards, and work towards identifying and correcting pollution problems. Watersheds that are not meeting their state designated beneficial uses are included in the state 305(b) report to Congress and listed on the 303(d) list. When impaired water bodies are identified a TMDL document is created by the State, which addresses potential sources of contaminants and action plans to improve water quality, in order to achieve state standards.

Antidegradation Policy for Beneficial Uses

As required by the Clean Water Act, the State of Utah has adopted a Water Quality Antidegradation Policy that requires maintenance of water quality to protect the instream Beneficial Uses existing as of 1975. The Clean Water Act also directs each State to establish a Nonpoint Source Management Plan. The State of Utah Division of Water Quality and USDA Forest Service Intermountain Region have agreed through a 2009 Memorandum of Understanding to use Forest Plan Standards & Guidelines and the Forest Service Handbook (FSH) 2509.22 Soil & Water Conservations Practices (SWCPs) as the Best Management Practices (BMPs) to meet the water quality protection elements of the Utah Nonpoint Source Management Plan.

State of Utah UPDES Pesticide Permitting Requirements

Under current regulations regarding Utah Point and Nonpoint Source Management, the proposed action alternative to treat Surface Waters of the State with piscicide would first require a UPDES pesticide use permit from the Utah Division of Water Quality.

Army Corp of Engineers Permits (CWA section 404)

The State Engineer's Office – Division of Water Rights issues stream alteration permits needed to construct or remove stream barriers, including natural barriers. This permit is issued jointly with the U.S. Army Corps of Engineers (404 permit). If action is chosen to construct a fish barrier in the lower portions of Fish Creek, then stream alteration permitting/conference with the State Engineers Office and U.S. Army Corps of Engineers would first be required.

Executive Order 11988 of May 1977 – Floodplains

This order requires that agencies: restore and preserve the natural and beneficial values served by floodplains; evaluate potential effects on floodplains; consider alternatives to avoid adverse effects in floodplains; minimize potential harm; allow the public early notification and review opportunities of plans or proposals within floodplains.

Executive Order 11990 of May 1977 – Wetlands

This order requires that agencies: minimize the destruction, loss or degradation of wetlands; enhance the natural and beneficial values of wetlands; avoid new construction in wetlands unless there is no practical alternative and harm is minimized to the extent practicable; provide early public review including development of procedures, and consider maintenance of natural systems including long-term productivity.

Affected Environment

Physical Setting

The Uinta Mountains are an east-west trending mountain range with landscapes resulting from extensive glaciations eroding material from the core of the Uinta Mountain and depositing it at lower elevations forming numerous moraines of unconsolidated materials. Within the basins are numerous lakes, seeps, springs, and ground water dependent meadow areas. Many of the meadows are lakes that have filled in or are filling in and are referred to as fens. Fens are dependent on ground water for their existence. Little is known about ground water dependent systems in the Uintas.

The drainages proposed to be treated in the High Uintas Wilderness consist of a complex ecological pattern of wetlands (peat lands, bogs, fens etc.), lakes and streams. Many of the components of the drainages are dependent on ground water with upwelling being a common feature in these areas. They also have water at or near the surface for most of the year. The project area lies within six subwatersheds of the Lake Fork River, Yellowstone River, and Rock Creek drainages of the Uinta Mountains. All water bodies proposed for treatment, except for a five-mile portion of Fish Creek, are located within the High Uintas Wilderness.

Upper elevations of these subwatersheds exceed 12,000 and 13,000 feet along the crest of the Uinta Mountains. Elevation of the lakes and streams proposed for treatment ranges from 9,000 feet in the lowermost sections of Fish Creek to over 11,500 feet in the headwater portions of the drainage basins. Project area drainages have experienced repeated glaciations, expressed in the landforms by numerous glacial lakes, ground and lateral moraines, and montane fen meadows. Geology is predominately underlain by quartzite intermixed with bands and isolated outcrops of relatively insoluble Precambrian shales. Lower portions of Fish Creek are near the geologic contact between the quartzite geology of the Uinta formation and limestone geology of the Madison formation. Because of the limestone geology there is a potential for subsurface water transport in the lower portions of Fish Creek.

Watershed Hydrology

The proposed treatment areas are within the headwater drainages of the western Uinta Mountains. Hydrology here is a snowmelt dominated system with peak flows typically occurring in June. The primary storm pattern influencing precipitation is frontal storms from the Pacific during winter and spring. Secondary precipitation occurs as thunderstorms from the south and southwest during summer and early fall (Tingstadt 2010). Annual precipitation in the treatment areas ranges from 24 inches in the lower elevations of Fish Creek to over 40 inches at the headwater divides (NRCS 1998).

Numerous surface water streams, lakes, ponds, springs, seeps and wet meadows exist throughout the proposed treatment areas. Streams vary within the subwatersheds depending on gradient, and underlying geomorphic features such as bedrock nicks and glacial moraines. Generally, the streams emerge from springs at the bases of the talus ridges high in the project area watersheds, and collect in numerous feeder channels consolidating from the upper basins into larger and fewer channels down valley. Depending on gradient and underlying geologic features, channels vary from steep bedrock and boulder cascades, to moderate gradient, moderately confined streams with cobble-sized substrates, to low gradient, meandering channels with cobble, gravel, or silt bottoms. Sinuous low-gradient streams are often associated with large wet meadows, fed by numerous side springs, seeps, and fens. These groundwater fed wetland features are more common in headwater and mid-basin areas of the proposed treatment areas.

Lakes in the proposed treatment areas range from small pothole ponds to 80-acre water bodies. Depths of these water bodies proposed for treatment can vary from a meter or less up to 16 meters (Doll Lake). Lakes in the treatment area are cold water and relatively low in productivity. Based on existing field data of lakes in the treatment areas and in similar quartzite geology and elevations elsewhere in the High Uintas, lake pH typically ranges from 6.8 to 7.7, conductivity 8-16 microsiemens, and alkalinity 2-16 milligrams/Liter. Summer maximum temperatures in these high elevation lakes are highly influenced by their depth and sunlight penetration. In lakes of moderate (5m) depth or greater, typical summer temperature profiles range from 4 – 10^{o}C in the depths to 8-16 degree temperatures at the surface. Forest Service field surveys of High Uintas lakes indicate summer season thermoclines (stratification) can occur in lakes 7-8 meters and greater in depth. All of these characteristics are typical of high mountain lakes.

Water Quality

The State of Utah applies water quality standards classified by designated beneficial uses for which the waters are used. Beneficial use designations and water quality standards that apply to the waters within the proposed treatment areas are:

Class 1C -- Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water

Class 2B -- Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.

Class 3A -- Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.

Class 4 -- Protected for agricultural uses including irrigation of crops and stock watering.

Water chemistry analysis is compared to the standards for these categories in determining whether State standards are met. (Rule R317-2 Standards of Quality for waters of the State of Utah, Division of Water Quality as in effect on March 1, 2012).

All streams and water bodies within the proposed treatment areas are currently designated by the State of Utah Division of Water Quality as fully-supporting all beneficial uses and water quality standards (Utah Division of Water Quality 2010). No impaired water bodies exist within or adjacent to the project areas.

Municipal Watersheds

The Fall Creek portion of the proposed treatment areas lies within surface water source protection zones 2 and 4 of the municipal watershed for the town of Duchesne, UT. Drinking water inlet for this municipal source is over 35 miles downstream of the proposed treatment area.

All proposed treatment areas are within source protection zones 3 and 4 of the municipal watershed for the town of Green River. The location of this municipal drinking water inlet is more than 200 miles downstream of the proposed treatment areas.

Surface water source protection zones are defined by the Utah Division of Drinking water as follows:

Zone 1 begins 100 feet downstream of a municipal water intake and extends 15 miles upstream, along primary perennial tributaries at a width of 1 mile (½ mile from the high water line of either bank)

Zone 2 is a 2,000 foot wide zone (1,000 feet from either bank) extending along primary perennial tributaries, the distance 15 to 50 miles upstream of the water intake.

Zone 3 is a 1,000 foot wide zone (500 feet from either bank) extending along primary perennial tributaries, the distance from 50 miles upstream of the water intake to the drainage divide.

Zone 4 is defined as the entire drainage area upstream of the intake to the headwater divide that was not already classified in zones 1, 2, or 3.

The Source Protection Plan for the Duchesne municipal water system considers source protection zone 1 to be the area of most concern in its assessment of potential contaminants. Possible contaminant sources identified within zone 1 considered having higher potential for impact to water quality are: oil and brackish water from oil wells and pathogens from livestock grazing and watering on and around Starvation Reservoir. The Source Protection Plan for the Duchesne municipal water system concluded that potential contamination sources were adequately controlled through appropriate Federal, State, or local agencies. The Source Protection Plan for the Duchesne municipal water system cited best management practices outlined in the Ashley National Forest Plan as adequately mitigating potential point and nonpoint pollutant sources on Forest Service lands.

The town of Green River municipal water system draws its source from the Green River with its designated surface source protection zones covering all or part of seven counties within the State, by far the largest municipal watershed in Utah. The Green River source protection plan describes the municipal watershed as being unique for its large source area and observes that Green River municipality has very limited influence on regulatory matters throughout the entire watershed. The document does cite the vast amount of federally administered lands within the watershed and considers this a benefit or

reduction in the sensitivity of the drinking source due to the water protection policies and best management practices incorporated on these lands.

Four potential contamination sources are identified in the Green River municipal source protection plan as having primary importance for the municipal drinking water source. Those are: animal feeding operations, agricultural fertilizer and pesticide runoff, residential septic systems, and paved areas (urban runoff) within source protection zone 1. This zone is located over 200 miles downstream of the project area.

Environmental Consequences

This section identifies and analyzes the potential direct and indirect effects on water resources resulting from the No Action and the Proposed Action alternatives. Impacts to soil and water resources are evaluated based on both potential temporary and permanent impacts. This section addresses Issue #5: Effects of rotenone and neutralization using potassium permanganate on water quality, particularly its effect on municipal water supplies.

Alternative 1: No Action Alternative

Existing conditions would not be altered by this alternative. Water quality, wetlands, floodplains and municipal water sources would continue as they are now.

No additional direct, indirect, or cumulative effects on these resource values are anticipated from this alternative.

Alternative 2: Proposed Action

Municipal Watersheds

In the 2007 EPA Re-registration Eligibility Decision (RED) for the piscicidal use of rotenone, drinking water was analyzed as a potential route for human exposure. The EPA determined that acute (short-term consumption) risk of drinking water treated with rotenone formulations were below levels of concern. The EPA estimated that chronic risk (long-term consumption) could occur for drinking water with rotenone concentrations above 40 parts per billion (ppb) for the most sensitive population subgroups, infants and children (EPA 2007a, Turner et al. 2007).

In the 2010 Rotenone Standard Operating Procedures (SOP) manual and on new product labeling, mandatory procedures are described for surface waters treated with rotenone formulations that are used as drinking water sources or are hydrologically connected to drinking water wells. Waters treated at an application rate >40ppb of rotenone require the applicator 7 to 14 days prior to treatment to notify municipal water suppliers and individual private water users in the affected treatment area against consumption of rotenone treated water until concentrations of rotenone have reduced below 40 ppb. Monitoring is required to determine these levels by either chemical sampling/analysis or by bioassay (demonstrating sentinel fish of the salmonidae or centrarchidae species can survive for 24 hours). The SOP manual indicates this <40 ppb concentration of rotenone may also be demonstrated by calculating the dilution ratio of untreated waters (example; confluence of treated water with large untreated tributaries) or by demonstration of degradation through a large distance/travel time between the rotenone treatment point and the site of water withdrawal for drinking (EPA 2009, Finlayson et al. 2010).

Due to the variable persistence of rotenone under certain environmental conditions, the EPA also requires chemical deactivation with potassium permanganate of all rotenone treated water flowing from lakes and streams beyond the designated treatment area. In rare instances chemical deactivation may be deemed unnecessary by certain criteria, such as when the stream goes dry within two miles or two hours travel time below a treatment area or when dilution with untreated water (confluence with a major tributary) reduces the concentration of rotenone to undetectable levels (<2 ppb) (Finlayson et al. 2010).

Effects of the proposed piscicide treatment to municipal supplies are not anticipated for the Duchesne municipal water system. This is due to the planned chemical deactivation of waters leaving the proposed treatment area, the headwater location of the Fall Creek treatment area 35+ miles distant from the municipal intake, and the added dilution effect of the confluence of numerous tributaries, rivers, and reservoirs in those 35+ stream miles. By the same factors no effect would be anticipated for all the proposed treatment areas to the city of Green River municipal water system over 200 miles downstream.

Water Quality

The Proposed Action to apply piscicide to the selected treatment areas would result in a direct short term effect to water quality. Depending on the concentration rates that are applied to achieve fish eradication, rotenone levels within the treatment area could temporarily exceed State beneficial use and EPA standards for drinking water, secondary contact recreation (wading, swimming), and coldwater aquatic organisms. Planned chemical deactivation below treatment areas as well as downstream distances to nearest public water intakes and private residences would limit these effects to the treatment/project areas (the treated subwatersheds on the Forest). In the coldwater environment of the treatment areas, rotenone would remain active for a period of days in flowing streams/wetlands and for a period of weeks or months in lakes (Finlayson et al. 2000, Turner et al. 2007).

To mitigate against any potential adverse effect, the rotenone SOP manual and product labeling require notification of public and private water users to prevent drinking water withdrawal from waters with levels greater than 40 ppb of rotenone (Finlayson et al. 2010). However, as previously stated, because rotenone would be neutralized below the treatment area and the distance to the nearest public water intakes, concentrations of rotenone over 40 ppb is not expected outside the proposed project area. Monitoring through chemical sampling or by bioassay demonstrating sentinel fish of the salmonidae or centrarchidae species can survive for 24 hours would determine rotenone levels and identify when levels are below 40 ppb.

To prevent secondary contact with waters containing greater than 90 ppb rotenone, applicators are required to wear protective gear when entering treated waters. To prevent recreational contact by the public, SOP manual and product labeling require signs posting the closure of treated waters to recreational access during the treatment.

The public notification and treatment area restriction plan would follow the rotenone SOP manual (Finlayson et al. 2010). If treatment concentrations are greater than 90 ppb, which is the EPA's determined level of concern for swimming exposure to most the sensitive population group (toddlers), then access to flowing waters (streams) in the treatment area are to remain closed for a period of three days or until chemical sampling or 24 hour bioassay survival of sentinel fish demonstrate that rotenone concentrations are

below 90 ppb. Lakes (standing waters) are to remain closed for a period of 14 days or until chemical sampling or 24 hour bioassay of sentinel fish demonstrate that rotenone concentrations are below 90 ppb, whichever is less (EPA 2007a, Finlayson et al. 2010).

In the coldwater conditions present in the proposed treatment areas, lakes could remain active with rotenone beyond the 14-day closure period outlined in the SOP manual. Due to the wilderness setting, where visitors use surface waters as a primary drinking water source, lakes treated with rotenone would remain closed to public use until bioassay demonstrate that rotenone levels have reduced below 40 ppb. This sampling would be a coordinated effort between the Forest and UDWR and be initiated at the time of treatment and then at least once weekly following treatment until rotenone has dissipated.

Short term water quality effects are also anticipated for the State-designated beneficial use class supporting aquatic organisms (see Aquatic Resources section of this chapter). Mitigation measures to reduce these potential water quality effects include: treating at the minimum concentrations and time-duration necessary to achieve desired results to target fish species, treating sites during the time of year when target streams would be at base flows and some sensitive life stages would not be present, and leaving springs and headwater locations where fish are not present untreated to act as refugia for downstream recolonization of treated areas.

Field studies have shown applications of rotenone in lakes at concentrations sufficient to eradicate fish will cause significant declines in zooplankton densities, especially caldocerans and copepods (Bradbury 1986 and Ling 2003 in Turner et al. 2007). Some studies have documented increases in phytoplankton and algae blooms occurring in lakes and ponds treated with rotenone. Reasons attributed to these blooms were increased nutrient content of water due to fish kills and/or the marked reduction in zooplankton populations (the organisms that feed on algae) post-treatment. Blooms, when they occurred, were reported to last 1-2 months. Some studies indicate greater incidence of algal blooms with spring rotenone treatments than with fall rotenone treatments, suggesting that fall treatments allowed for winter/springtime recovery of zooplankton (Hanson et al. 2006 in Turner et al. 2007). Observed times required for full recovery of zooplankton communities ranged from 17 weeks to 4 years.

Other ingredients in liquid rotenone formulations with a potential to affect water quality include petroleum distillates and other compounds such as benzene, xylene, naphthalene, toluene, and trichloroethylene. Risk assessments consider the concentrations that these compounds are applied in piscicide formulations being below levels of human or environmental concern (Turner et al. 2007). However, these hydrocarbon solvents may produce a detectible odor in treated waters. The duration of this water quality effect lasts a few days.

Potassium permanganate, a strong oxidizing chemical agent, is often used in water treatment plants and is also used to deactivate rotenone. It has been shown to be toxic to fish and aquatic organisms. Effects are expected to be short term and limited to the vicinity (within 30-minute travel time down current) of the rotenone deactivation area.

No additional sedimentation or long-term alteration of nutrient content or water chemistry is anticipated for treated waters.

Short-term impacts to water quality is expected to last from a couple days in flowing streams/wetlands to weeks or months in lakes. However, as a result of transport, dilution,

and the breakdown of rotenone compounds and the other ingredients present in liquid piscicide formulations, long term effects to water quality within and downstream of treated areas are not expected. Though as previously mentioned and discussed further in the Aquatic Biological Resources section, the timeframe for recovery of some non-target aquatic species may be several years.

Floodplains

No short term or long term effects to floodplain function are expected for the proposed project areas. The treatments as proposed would not involve filling, confinement or obstruction of channels and floodplains. Existing natural fish barriers would be used in treatments and subsequent CRCT reintroduction. No new fish barriers structures would be constructed in wilderness areas.

Wetlands

Toxicity and field studies of rotenone and liquid rotenone formulations indicate no short or long term direct effects to wetland plants at the concentration levels applied for fish eradication (Turner et al. 2007).

Complex wet meadow systems can be found in portions of the proposed treatment areas. Features of these wet meadows (multiple side channels, spring runs, floating bogs, seeps, and fens) may prove challenging to treat for complete fish removal. In such settings, dosages of rotenone can be more difficult to control with potential for increased mortality to non-target aquatic organisms. Timing treatments during the driest period of the year, treating only areas with fish present, treating in multiple years with minimum dosages, and the use of block netting in side seeps/springs can mitigate for some of these non-target effects.

Rotenone rapidly degrades in soil. However, low levels of rotenone may persist in soils over relatively long periods of time. Rotenone persistence in the soil water interface in shallow water settings such as wetlands could be expected to be within a period of days to two weeks (Turner et al. 2007). Temperature has a strong effect on rotenone persistence in soils (Cavoski et al. 2008). In settings where soil temperatures remain cold, persistence could be longer.

Groundwater

Due to the strong tendency of rotenone to bind with organic soils, sediment, and vegetative matter, it is unlikely to move through most soils into groundwater. In very sandy soils with low organic content there is some potential for leaching, but even then mobility would be limited (EPA 2007). No well-monitoring, associated with rotenone treatments or otherwise, has documented a detection of rotenone or other rotenone metabolites (Finlayson et al 2000, Turner et al 2007).

In stream settings, where rapid transport of subsurface water is present (such as in losing streams over karst geology, fractured bedrock, and areas of soil piping associated with glacial till) there is a potential for rotenone entering shallow groundwater and resurfacing in areas not intended for treatment. In areas where this is suspected, non-toxic dyes would be used to identify subsiding and resurfacing water. Establishment of avoidance areas or changes in the layout of deactivation stations would be incorporated in the

treatment plan to reduce the risk of rotenone treated water resurfacing in unintended areas.

In the proposed project area, one potential area is in the lower reaches of Fish Creek, where surface limestone geology is present ½ mile to the south and geologic mapping indicate two fault lines running in proximity to the streambed. Field survey in the coming year will determine if this stream segment is losing water to the subsurface and would warrant exclusion from piscicide treatment.

Cold Deep Lakes

Strong lake stratification and cold water temperatures can affect rotenone treatments in regards to even distribution of the piscicide throughout the water column and the time required for rotenone to break down. In some cold water settings, rotenone has been observed to persist in the water column and sediments weeks to months after treatment (EPA 2007a, Finlayson et al 2000, and Turner et al. 2007). The persistence of rotenone could potentially delay the recovery of macroinvertebrate populations and the time when cutthroat trout could be restocked.

Cumulative Effects

The cumulative effects analysis areas for water resources are the project area drainages from the headwaters within the High Uintas Wilderness downstream through the project area to approximately one-half mile downstream of the neutralization sites. This area was selected as the cumulative effects analysis area because it encompasses the area on the south slope of the Uinta Mountains that would include effects to water resources from activities occurring upstream of the project area and at the broader hydrologic scale. Past, current, and foreseeable activities within these subwatersheds include:

- Portions of the proposed treatment are within grazing allotments for sheep, cattle and recreational stock. Water resources can be affected by livestock directly through physical alteration of stream banks or indirectly through utilization of streamside riparian vegetation and alteration of stream water quality (increased nutrient sediment loads). Potential effects to water resources are minimized by implementation of best management practices and utilization criteria in allotment management plans.

- Recreational use is highest in the Garfield Basin portion of the proposed project, though all areas receive visitation. Popular activities include backpacking, horse packing, primitive camping, and recreational fishing. Higher use within the wilderness tends to be localized along trails and popular lakes.

- Reservoirs can alter natural flow frequencies, sediment loads, inundate wetlands, and provide barriers to passage of aquatic organisms. Within the proposed Garfield Basin treatment area, Bluebell, Drift, Five Points, and Superior Lakes were natural lakes that had dams constructed on them during the first half of the 20th century for irrigation storage. As part of the High Lakes Stabilization project (2006-2010), the dams on these lakes were stabilized and decommissioned,

restoring the natural lake pools. During the stabilization project a diversion canal from Superior Lake to Five Points Lake was also decommissioned. This resulted in stream flow returning to the natural channel below Superior Lake.

- Atmospheric deposition in the form of dust and air pollutants can influence alpine lakes that have inherently low buffering and acid neutralizing capacities. Water monitoring data of alpine lakes in the Uintas and western United States indicate a general increase in airborne nitrogen into these lakes.

No long-term effects are expected to water quality, floodplains, wetlands, or ground water as a result of activities associated with the Proposed Action. Therefore, there would be no cumulative effects as a result of activities of the Proposed Action and past, current, and foreseeable future activities.

Human and Ecological Health Concerns

This section addresses potential toxicological impacts on human and ecological health from the proposed use of rotenone as a piscicide to remove target fish. Application of rotenone and potassium permanganate to the environment could result in negative effects on human and ecological health.

Government agencies have conducted substantial research to determine the safety of rotenone for fisheries management applications in the re-registration approval process (Finlayson et al. 2010 and USEPA 2006). The EPA (2006) study found that while risks to terrestrial wildlife and plants were insignificant when rotenone was applied as a piscicide, risks to non-target aquatic organisms could be significant. The Forest Service contracted with Syracuse Environmental Research Associates, Inc. (SERA) to prepare a Human Health and Ecological Risk Assessment (HHERA) for rotenone to help identify exposure issues and potential mitigation measures needed beyond applying the rotenone formulation according to label directions for fisheries management (SERA 2008). The HHERA was used as the primary reference for evaluating the human health and ecological risks of the Proposed Action.

Affected Environment

The study areas for the analysis of human and ecological health include the waters proposed for treatment located within three drainages on the south slope of the Uinta Mountain range. This includes the Rock Creek, Lake Fork River and Yellowstone River drainages from the headwater seeps and springs, downstream to the mainstem rivers. In the Rock Creek drainage, this would include the drainage area upstream from the confluence of Fall Creek with Rock Creek. In the Lake Fork River drainage, this would include the Ottoson Basin from the confluence of Ottoson Creek and Lake Fork River; Oweep Creek confluence and Lake Fork River; and Fish Creek from Toquer Lake downstream to Moon Lake. The affected area within the Yellowstone River drainage would include the Garfield Basin, including Garfield Creek to the confluence with the Yellowstone River and the Swasey Hole area downstream to the confluence with the Yellowstone River. Air, surface water, groundwater, sediments and biota potentially containing rotenone or formulation constituents are considered potential exposure media

in the affected environment. Beneficial uses of water within the drainages containing proposed waters to be treated as set forth and defined by the State of Utah include domestic, recreation, cold water aquatic life, and agricultural water supply (see Soil and Water Resources section). The following sections provide a general overview of the toxicology and use of rotenone and potassium permanganate to remove nonnative trout as part of the Proposed Action.

Rotenone Toxicity

Rotenone is a naturally occurring chemical obtained from the roots of several tropical and subtropical plant species belonging to the genus *Lonchocarpus* or *Derris*. Liquid formulations of rotenone may contain petroleum hydrocarbons as solvents and emulsifiers to disperse rotenone in water (naphthalene, methylnaphthalenes, xylenes, etc.). The proportion of these carriers varies substantially by formulation, and formulations with synergists generally contain far less petroleum-based carrier products. The Proposed Action involves the use of commercial liquid rotenone formulations including CFT Legumine™ and Prenfish Toxicant® which contain dispersants and emulsifiers (table 11). Powder formulations of rotenone proposed for use in treating lakes are made from ground plant roots. These powdered formulations may contain fillers, but no materials of concern are added. The potential effects on ecological receptors associated with rotenone and other constituents in the proposed formulations are discussed in the Environmental Consequences section below.

Table 11. Inerts contained in end-use liquid formulations of rotenone (from SERA 2008)

Formulation (% of formulation classified as inerts)[a]	Name of Inert	Inert % by Weight
CFT Legumine (90%)[a]	N-Methylpyrrolidone	9.8%[c]
	Petroleum distillates, NOS	NOS
	1,2,4-Trimethyl Benzene	0.003%[c]
	Naphthalene	0.02551%[c]
Prenfish Toxicant (85%)[b]	Aromatic petroleum solvent	<=90%
	Naphthalene	9.9%
	1,2,4-Trimethyl Benzene	1.7%
	Acetone	<=7.5%
	Emulsifier # 1 (NOS)	1.5%
	Emulsifier # 2 (NOS)	4.5%

[a] Information taken from MSDS's unless otherwise specified. No hazardous inert ingredients are listed on the MSDSs for powder and pellet formulations.

[b] California Proposition 65: WARNING: This product contains chemicals known to the State of California to cause cancer or birth defects or other reproductive harm.

[c] Information on inerts in CFT Legumine from Fisher (2007).

Potassium Permanganate Toxicity

The neutralization of rotenone would involve the use of potassium permanganate ($KMnO_4$). Potassium permanganate salt, also known as "permanganate of potash," is a strong oxidizing agent used in many industries and laboratories. It is also used as a disinfectant, especially in the treatment process of potable water. It has been used effectively as a neutralizing compound for rotenone treatments for many years (USEPA 2006).

Environmental Consequences

Alternative 1: No Action

Under the No Action alternative, rotenone or potassium permanganate would not be applied. Therefore, there would not be any potential for exposure to humans. No direct or indirect effects related to chemical exposure would occur. This section addresses Issue #5: Effects of rotenone treatment and neutralization using potassium permanganate on water quality, particularly its effect on municipal water supplies.

Alternative 2: Proposed Action

Under the Proposed Action, rotenone formulations would be applied to target waters. Liquid rotenone containing associated dispersants and emulsifiers would be dispensed into target flowing waters and powdered formulations would be dispensed into ponds and lakes to remove fish populations.

Liquid piscicide formulations of rotenone including CFT Legumine contain inerts, adjuvants, metabolites, impurities, and contaminants in addition to the active ingredient rotenone. SERA (2008) examined the potential negative effects of these compounds on humans and concluded that metabolites, a breakdown product of rotenone, did not increase the risk of human health effects associated with the use of rotenone formulations. Similarly, it was concluded that available data indicate the inerts are not present in amounts that would increase the risks associated with the proposed formulations. The limited impact of impurities, such as degeulin and the "other associated resins" are identified in SERA (2008). These non-active ingredients will not be discussed further.

Potential for Public Exposure

The HHERA describes several ways humans may be exposed to rotenone. The highest potential exposure would be to workers from the preparation and application of rotenone. Dermal and inhalation exposure would be the primary routes of exposure for applicators. Oral exposure of humans to rotenone could occur from ingestion of water while swimming, ingestion of treated fish or other organisms. Human exposure could theoretically also result from ingestion of crops that have been irrigated with rotenone-treated water or ingestion of water where rotenone reaches a potable water intake. However, label directions dictate that treated fish not be used as food or feed, and that no use of rotenone should occur within ½ mile (upstream in rivers or streams) of irrigation or potable water intakes. Furthermore, U.S. EPA recommended mitigations to greatly reduce or eliminate exposure to the general public include restricting access for members of the general public to treated areas and the use of potassium permanganate to ensure rotenone is neutralized before it leaves the project area. Following these mitigations would greatly reduce the potential for public exposure to rotenone.

The intended use of rotenone is as a piscicide, a chemical used to remove fish from target waters. The potential effects of rotenone to other groups of animals, including humans when used as a piscicide are discussed here. Rotenone is somewhat selective in context of an aquatic application in that most species of fish are more sensitive to rotenone than are most species of aquatic invertebrates. For humans, there are basically two groups that

have the potential to be exposed to rotenone: crews conducting activities associated with the Proposed Action and the general public.

The review of rotenone uses and potential risks associated with these uses completed by the U.S. EPA provides some recommended mitigation measures to reduce risk (SERA 2008). These mitigations include:

- Lowering the maximum application rate from 250 ppb to 200 ppb;
- The use of effective personal protective equipment by workers;
- Restricted access for members of the general public to treated areas;
- The use of potassium permanganate to detoxify rotenone.

Assuming that these recommendations are implemented, the risks associated with the use of rotenone should be minimal. At application rates of the Proposed Action i.e., 50 – 150 ppb, hazard quotients for workers do not exceed the level of concern. As a result of the implementation of the above mitigation measures, members of the general public would not be exposed to significant levels of rotenone.

Human Health Risk Assessment

Concern has been expressed over the potential for exposure to rotenone to cause Parkinson's disease. It is clear that rotenone is neurotoxic, and therefore this is of concern. However, most studies demonstrating that rotenone can induce effects similar to those of Parkinson's disease were conducted using routes of exposure that are not directly relevant to potential human exposures (e.g., intraperitoneal or intravenous injection, direct installation into the brain, and consumption of large volumes of treated water). Additionally, these routes of exposure are not relevant to potential routes of exposure to rotenone that may occur during fisheries treatment projects. For applicators of rotenone during a treatment project, the use of required PPE would significantly reduce, if not eliminate, exposure (Finlayson et al. 2010). For the general public, restricting access to the treatment area until rotenone concentrations degrade to < 40 ppb (as determined by demonstrating the survival of sentinel fish following a 24-hour bioassay) and the use of potassium permanganate to neutralize water leaving the treatment area would greatly minimize the potential for exposure (Finlayson et al. 2012, USEPA 2007).

In addition to the active ingredient rotenone, all liquid formulations contain petroleum solvents, which are complex mixtures. These petroleum solvents do not appear to be present in amounts that are toxicologically substantial relative to rotenone and other related compounds (SERA 2008). Following the recommended mitigations of the U.S. EPA Reregistration Eligibility Decision (RED) for rotenone (of restricting access of the general public to the treatment area and using potassium permanganate to ensure rotenone would not affect areas beyond the treatment area) would result in no or minimal exposure to the general public. Because of this, the risk characterization for human health effects is relatively simple and focuses on risks to workers from dispersing rotenone and other associated activities of the Proposed Action. The recent RED prepared by the U.S. EPA's Office of Pesticide Programs requires that workers involved in application of rotenone use proper personal protective equipment (PPE). If the specified required PPE are properly used, only maximum application rate exceeds the level of concern (SERA 2008). The level of concern is also exceeded when effective PPE is not used and when there is an accidental exposure. Accidental exposures are included in all Forest Service

risk assessments to evaluate the proper handling of pesticides. Aggressive steps are warranted in the event of accidental exposures or mishandling of rotenone.

The U.S. EPA recommends the use of potassium permanganate to detoxify water treated with rotenone. If properly applied, potassium permanganate should not present any additional risk and should decrease risks associated with the use of rotenone as a piscicide. If improperly applied (i.e., applied in excess) the reduction in risk due to the neutralization of rotenone should outweigh risks associated with the use of potassium permanganate SERA (2008).

Ecological Risk Assessment

The Proposed Action primarily involves the use of rotenone with the intended purpose of removing all trout from treated waters. Therefore, if rotenone is applied at an effective concentration and duration, trout will die. The label specifies that the concentration of active rotenone necessary to remove trout using liquid CFT Legumine™ in streams and powder Prentox® in ponds and lakes is 25 – 50 ppb with a recommended duration of 4 – 8 hours. Because rotenone is diluted and detoxified with distance, multiple application sites are used along the length of treated streams, spaced at approximately ½ to 2 miles apart depending on the water flow travel time between sites.

Zooplankton and some species of aquatic insects are reported as some of the most sensitive aquatic invertebrates. Most aquatic insect species recover quickly following rotenone treatment. However, depending on how secondary effects are measured, changes in the invertebrate community of treated waters may persist for a prolonged period of time. A reduction of some of the more sensitive aquatic invertebrate species is unlikely to negatively affect the ability of the ecosystem to support fish populations (see Aquatic Species Section). When applied to aquatic environments, rotenone is not likely to have a direct toxic effect on terrestrial organisms. Indirect effects are likely to only occur in animals that consume fish as a substantial proportion of their diet. However, these would be short-term effects (see Terrestrial Wildlife section).

Cumulative Effects

The cumulative effects analysis area identified for human and ecological health is the project area drainages from the headwaters within the High Uintas Wilderness downstream through the project area to approximately one half mile downstream of the neutralization station. This includes the larger streams and rivers that could be affected by activities upstream in the drainage. This area was selected as the cumulative effects analysis area because it encompasses the area on the south slope of the Uinta Mountains that would include effects to human and ecological health from activities occurring upstream of the project area and at the broader hydrologic scale.

Very low concentrations of rotenone are used in fish management in accordance with the Environmental Protection Agency-required protocols, and the occupational risk of the piscicide use of rotenone would be negligible if used according to product labels and following application and safety guidelines in the 2010 American Fisheries Society Rotenone Standard Operating Procedures (SOP) Manual (Finlayson et al. 2010). With no direct effects, including no chronic effects, there would be no cumulative effects to human and ecological health from the Proposed Action or No Action alternatives. Although there is the potential for acute exposure to rotenone from the Proposed Action,

under the application schedule, because of the rapid breakdown of rotenone and neutralization using potassium permanganate, there would not be chronic exposure that could affect public health. Therefore, there would be no cumulative effects to public health from the Proposed Action.

Conclusion

Potential impacts to human and ecological health from exposure to rotenone have been recently reviewed by both the EPA during the re-registration process for rotenone use and by the Forest Service in relationship to the use of rotenone as a piscicide (EPA 2006, EPA 2007, and SERA 2008). While rotenone and potassium permanganate have been shown to have potential impacts to human health, the concentrations to be used, duration of application, and potential exposure routes from the Proposed Action limit the potential for human health impacts. Additionally, neutralizing rotenone with potassium permanganate, informing the public of treatment timing and location, and restricting public access to the treatment area would further ameliorate potential human health risks through reducing chemical exposure.

Environmental Justice

This section describes the existing social environment in the communities near the areas proposed for treatment and assesses the potential social impacts of the Proposed Action and No Action alternatives on Duchesne County and communities of the western Uintah Basin.

This analysis focuses on the environmental effects, including human health and economic and social effects on minority communities and low-income communities. Key socioeconomic parameters addressed in this section include local demographics, including population and race/ethnicity, and measures of social and economic well-being, including per capita income and poverty rates.

Affected Environment

This section provides a demographic overview of the local area residents, which will be used in an analysis of environmental justice impacts. The geographic scope of information presented is Duchesne County.

Duchesne County is located in northeast Utah. The Uinta Mountains which include the High Uintas Wilderness is located along the northern border of the county. The northern county boundary runs along the crest of the Uinta Mountains range. According to the U.S. Census Bureau (2010), the county has a total area of 3,256 square miles.

Population Trends and Projections

The state of Utah has experienced moderate growth in the past 20 years. As of the last census in 2010, the population of Duchesne County was 18,607. The population density was 5.7 people per square mile. The population density for the State of Utah was 33.6 people per square mile. Roosevelt and Duchesne are the two largest towns in the county and are the centers for commerce. Other towns include Altamont, Myton, Neola, and Tabiona. Unincorporated communities include Altonah, Bluebell, Fruitland, Hanna, Mountain Home, Strawberry, Talmage and Upalco.

Population growth from the period of 2000 – 2010 for Duchesne County was 29.5%, while the growth of the population of the state of Utah was 23.8% during the same time period.

Economy

The county is rich in oil and natural gas, which strongly influences the county's economy. Duchesne County's oil and natural gas extraction industries fluctuate according to international oil and natural gas markets (Duchesne County 2013). The median household income for Duchesne County was reported as $52,895. Per capita income for Duchesne County was $21,787 compared to $23,139 for the state of Utah. Poverty rates represent the percentage of an area's total population living at or below the poverty threshold established by the U.S. Census Bureau. Based on the 2010 Census data, the percentage of people in Duchesne County living below poverty level was 10.8%, which is the same level reported for the state of Utah. The poverty rate for Roosevelt city was reported at 18.7% (U. S. Census Bureau 2010).

There are nine outfitter and guide businesses operating in the High Uintas Wilderness Area including areas within the proposed project area. These businesses are operated by low-income groups that provide or support recreation opportunities within the proposed project area. Implementation of the Proposed Action may have an impact on their livelihoods.

Race/Ethnicity

Race is an important consideration for evaluating potential environmental justice-related effects of the Proposed Action. The population of Duchesne County is generally less diverse than the state of Utah. According to the 2010 Census, Whites (Caucasian) account for 87% of the population in Duchesne County compared to 80.4% for the state of Utah. Hispanics/Latinos made up 6% of the population in Duchesne County, while American Indians/Alaska Natives made up 4.5% (U S Census Bureau 2010).

Regulatory Setting

The USEPA Office of Environmental Justice offers the following definition of environmental justice:

> *"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations of the execution of Federal, State, local, and tribal programs and policies."*

Executive Order 12898, "*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*," requires each Federal agency to incorporate environmental justice into its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including

social or economic effects, of its programs, policies, and activities on minority populations and low income populations of the United States (Council on Environmental Quality 1997). This applies fully to programs involving Native Americans.

Environmental Consequences

Alternative 1: No Action

The No Action alternative would not affect resources used by minority or low-income communities or disproportionately affect minorities or low-income communities with environmental, human health, or economic impacts, because this alternative would not change existing conditions.

Alternative 2: Proposed Action

The nearest communities to the proposed treatment areas are the unincorporated communities of Mountain Home and Altonah and the town of Altamont. These communities are approximately 12 – 16 miles south of the nearest proposed treatment areas. Therefore, risks to human health of the residents of these communities from implementation of the Proposed Action are likely non-existent and would not disproportionately affect a minority or ethnic population group.

Cumulative Effects

There would not be a disproportionate effect on any minority or ethnic population group. Therefore, there would be no cumulative effects as a result of implementing the Proposed Action.

Short-term Uses and Long-term Productivity

The National Environmental Policy Act (NEPA) requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). This includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity of the affected resources for the Proposed Action is described below. Short-term impacts, primarily resulting from treatment with rotenone, are associated with implementation of the Proposed Action. However, the maintenance of long-term biological and economic resource productivity and the benefits for CRCT populations outweigh short-term adverse impacts on individual resources. The short-term uses of the environment for the proposed treatment are addressed below by resource category.

Aquatic Biological Resources

The Proposed Action would result in the short-term loss of all fish species present in the treatment area. CRCT are the only fish native to the proposed treatment areas. However,

these losses are part of the objectives of the Proposed Action and would be offset by restocking CRCT beginning the year after the final rotenone treatment, the long-term enhancement of ecological and other wilderness values, and the direct long-term benefit to CRCT as a result of removing competing and hybridizing nonnative fish that are incompatible with recovery.

The Proposed Action would result in short-term impacts on benthic macroinvertebrate species densities and composition and potentially long-term impacts on rare and endemic benthic macroinvertebrates. Species composition would be expected to recover substantially within two years of the final treatment. There are no known special-status or endemic species currently inhabiting the proposed treatment area. However, loss of any rare or endemic species would be an adverse consequence of the Proposed Action with unknown and unquantifiable effects.

The Proposed Action would have temporary, minor impacts on riparian habitats adjacent to the stream corridor. The Proposed Action would not involve use of any heavy equipment or any excavation or tree or vegetation removal. The only disturbance would be from foot traffic of workers applying treatment chemicals from the stream banks. Therefore, the Proposed Action would have only minor short-term direct impacts on riparian habitat and no indirect or long-term effects on productivity or re-establishment of riparian habitat.

Terrestrial Biological Resources

The Proposed Action could have short-term effects on terrestrial wildlife (i.e., riparian bird species) by temporarily removing some benthic macroinvertebrate species from the proposed treatment area, thereby reducing a major food source from this limited area. The temporary loss of benthic macroinvertebrates and their terrestrial forms may impact insectivorous wildlife. However, this short-term effect of the rotenone treatment would be offset by recolonizing benthic invertebrates from adjacent off channel habitats and headwater basins.

Another short-term effect to terrestrial wildlife would come from noise produced or human presence from activities required to complete the proposed project which includes applying rotenone to proposed treatment areas. This noise or human presence would not be any greater than what normally occurs with the current recreational use. These short-term effects would not affect long-term productivity.

Wilderness Values and Management

The Proposed Action would result in some short-term effects on wilderness experiences. The rotenone treatment in selected headwater basins would likely temporarily detract from the wilderness environment while the treatment is occurring. Some wilderness visitors could find the use of chemicals inconsistent with their assumptions about wilderness. In addition, chemical application would require the use of motorized volumetric augers powered by generators to dispense the neutralizing agent, potassium permanganate. Some visitors may view the potential loss of non-target species (specifically benthic macroinvertebrates or aquatic insects), due to the chemical treatment, as inconsistent with wilderness values. These impacts would be minimized by using the lowest effective chemical concentration required to remove target fish species. In addition, the longer-term effect of the treatment would be beneficial, resulting in

elimination of non-native fish and restoration of CRCT to its native habitat within the wilderness area.

The Proposed Action would have a direct, adverse impact on recreational fishing in the basins where selected lakes and streams have been treated for a three to five-year period. Although potential visitors may seek fishing opportunities within basins where lakes and streams are being treated, the High Uintas Wilderness provides a broad range of recreational opportunities and recreation experiences similar to those within areas proposed for treatment.

While recreational fishing activity could be diverted to other recreation areas, the amount of use is such that it would not increase the use of other areas to a degree that substantial physical deterioration would occur or be accelerated. Overall, recreational use of treated areas in the long-term is expected to not be affected by the Proposed Action.

Soil and Water Resources

Short-term impacts of the Proposed Action from chemical treatment, neutralization and other activities on surface water quality, hydrology and geomorphology would include potential temporary impacts of rotenone toxicity. Rotenone degrades rapidly in the presence of sunlight and warm temperatures and may persist in natural water bodies from between a few days to several weeks, making this a short-term effect. These short-term effects would have no long-term effect on the productivity of treated lakes and streams within the proposed project area.

Human and Ecological Health Concerns

There would be no short-term or long-term impacts on human health due to the remoteness of the area proposed for treatment, the distance to any downstream human population and procedures employed to minimize worker exposure. The Proposed Action would have short-term impacts on amphibians, aquatic macroinvertebrates, terrestrial and avian wildlife that would not affect long-term productivity.

Environmental Justice

The Proposed Action would not disproportionately affect a minority or ethnic population group. However, there is a potential to negatively affect fishing outfitter and guides which may be considered a low-income group. Also, the potential beneficial impact on local economic conditions in the long-term would likewise be beneficial for fishing outfitter and guides and other environmental justice factors.

Unavoidable Adverse Effects

The following section identifies the Proposed Action's impacts that would be significant and unavoidable because no practicable mitigation measures are available. The No Action alternative would not result in unavoidable impacts but would not achieve the objectives of expanding CRCT populations in its native range.

The Proposed Action could result in the loss of individual benthic macroinvertebrate taxa, potentially including rare (unquantified) or unidentified species endemic to selected lakes and streams. Although no specific aquatic insect species that are classified as threatened, endangered or other special-status categories are known to be present in the

proposed treatment area, the treatment could result in loss of rare or endemic species that may be present in selected streams and lakes. However, the aquatic habitat proposed for treatment is common coldwater habitat in the Uinta Mountains and rare endemic species have not been found and would not be expected to be found. Therefore, the risks of extirpating a rare endemic species are considered to be low. In addition, mitigation measures such as leaving headwaters untreated and treating with lowest necessary concentrations would further reduce impacts and risk.

Although the risk is considered very low, the treatment could result in loss of rare or endemic species. This would be a significant impact. However, this impact cannot be verified. No reasonable sampling program can conclusively determine the nonexistence of any endemic species. Therefore, no additional mitigation measures are available to reduce this impact. This impact cannot be monitored or verified because of the variety of factors that hamper full characterization of the stream community and thus identifying or detecting the loss of rare or endemic species is infeasible (Vinson et al. 2010). This impact would remain significant and unavoidable after mitigation.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

Proposed Action (Rotenone Treatment)

The Proposed Action would not result in an irreversible commitment of resources. The Proposed Action would not involve installation of any structures, loss of habitat, or removal or mining of resources. However, there would be irretrievable commitments of biological and recreational resources.

Biological Resources

An irretrievable loss of resources would occur with the mortality of the non-native fish that currently occupy lakes and stream reaches in the proposed treatment area. However, these fish would be replaced with CRCT and fish populations would be restored through restocking. Therefore, the loss of the non-native fish population would not constitute an irreversible loss of resources.

Recreation

Under the Proposed Action, the treatment area would not contain a recreational fishery until the area was restocked. The timing and rate of restocking is not part of the Proposed Action. The localized loss of the fishery until recovery following restocking would constitute an irretrievable commitment of a recreational resource to non-recreational use because it represents an opportunity foregone for a period during which the resource cannot be used.

Other Required Disclosures

The National Environmental Policy Act (NEPA) at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders."

The Forest Service has consulted with or is not required to consult with the agencies listed below as required under the following Acts and laws:

- Fish and Wildlife Service under the Fish and Wildlife Coordination Act for causing water to be impounded or diverted:

  The Forest Service is not required to consult with the Fish and Wildlife Service under the Fish and Wildlife Coordination Act because there would be no water impounded, diverted or depleted as a result of the proposed project.

- National Historic Preservation Act for causing ground disturbing actions in historical places:

  The Forest Archaeologist reviewed the proposed project as described in the Project Initiation Letter (PIL) dated April 19, 2010. The project as described would not involve any ground disturbing activities nor would it affect any structures or buildings on the Forest. Camping activities by project personnel would be similar in type and duration to authorized public camping and would not be an additional effect. In addition, the Proposed Action would not have a disproportionate impact on traditional or cultural purposes.

  Pursuant to regulations specified in 36 CFR 800.3(a) (1), this project is a type of activity that has "no potential to cause effects" to any type of cultural resource. Subsequently, the agency has no further obligations under Section 106 regulations and the Forest is not required to consult with the State Historic Preservation Officer (SHPO) or Indian Tribes regarding this project. The Ute Tribe was included in the scoping process and received a scoping letter.

- U.S. Fish and Wildlife Service and the National Marine Fisheries Service in accordance with the ESA implementing regulations for projects with threatened or endangered species:

  The Ashley National Forest consulted with the U.S. Fish and Wildlife Service on the proposed project. The Forest provided a Biological Assessment to the U.S. Fish and Wildlife Service on December 16, 2010 for review and concurrence. The Biological Assessment considers potential impacts to terrestrial Threatened, Endangered, Proposed and Candidate species resulting from the proposed project. Upon review, it was determined that the proposed project "may affect, but is not likely to adversely affect" the Canada lynx and wolverine. It was also determined that there would be "no effect" to the Mexican spotted owl, yellow-billed cuckoo, black-footed ferret, greater sage grouse and mountain plover. The Fisheries Biologist determined that there would be "no effect" to the four endangered Colorado River fish species. The

U.S. Fish and Wildlife Service concurred with these determinations on January 6, 2011.

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